

Part

one"



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston Texas 77058

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STS-5 AIR/GROUND TRANSCRIPTS
PART 1
PRE-LAUNCH THROUGH MET 01:09:34

(garble) Okay

(garble) we'll be going a cabin vent around T-30.

SPACECRAFT Alright, say again.

KSC I say, we should be doing a cabin vendor around T-30.

SPACECRAFT Okay

KSC Go ahead, (garble)

SPACECRAFT (garble)

KSC Okay, 5:51, you have a go to perform the clearing of the closeout crew from the FSF. Position the SS elevator to the pass service level doors closed. Position and power switch in the off position.

SPACECRAFT I copy, thank you. Arty, when I leave the net in. I'll be back in combat zone 105.

KSC Understand

SPACECRAFT Okay (garble)

KSC (garble) and reporting (garble)

SPACECRAFT Thank you.

From TLC 12 (garble) I can report step 527 complete.

SPACECRAFT Okay, that was after we done the T?

KSC Yeah, that's confirm

SPACECRAFT Thank you

PAO This is Shuttle launch control at T-35 minutes and counting. Activation of the S-band to high power is complete and the support personnel at the landing sites and booster retrieval area are being pulled on their readiness to support the launch. The solid rocket boosters will be recovered after launch by two ships operated for NASA by United States Boosters, Inc. The UTC Liberty and the UTC Freedom departed their docks here at about 8:30 a.m. yesterday morning. The booster's impact approximately 140 miles due east of the Kennedy Space Center in the Atlantic. The ships take approximately 10 hours to reach the impact area. Beginning at seven and a half hours before launch the ships have been conducting a five hour electronic and visual search of the

impact area to ensure that the area is clear. At T-35 minutes the ships arrive on station just 8 miles from the predicted impact point. This is several miles closer to the impact zone than on previous flights. The booster casings suspended from their parachutes will hit the water at about 62 miles per hour. Commander Vance Brand looking out the window on the Orbiter commented to the launch team on how beautiful the sky was, he said it's a red sky and no clouds and he thanked them for arranging that for the launch this morning. The countdown going smoothly, the clock at T-33 minutes, 25 seconds and counting, this is Shuttle Launch Control.

(garble)

(garble) Perform the (garble) DFS (garble) please.

SPACECRAFT Roger in work. Okay (garble) CDRS verify. We have task VFS transfer to prep complete, advise we have about 8 or 9 messages (garble) on the top.

KSC Did you copy that DPS?

SPACECRAFT I copied, those are expected to be (garble)

SPACECRAFT Okay, should just leave them then.

KSC You can go ahead and clear it out if you'd like.

SPACECRAFT That's okay, will. We'll test to look at the (garble) summary and then we'll clear it out.

KSC And DPS do (garble) you verify 517.

SPACECRAFT (garble)

KSC Okay and CDR very shortly we're going to want to have you perform the (garble) 2 pressurization

SPACECRAFT (garble)

KSC (garble) 517 is there a (garble)

PAO This is Shuttle Launch Control, T-30 minutes and counting. The land launch and recovery director has directed the chase aircraft to be manned in just about 5 minutes. John Young commander on the first Shuttle flight will take off in the Shuttle training aircraft to check out the weather for possible return to launch site abort. At the same time the backup flight system computer data transfer capability is also being tested. The orbiting maneuvering system engines have been pressurized for launch.

KSC Verify

SPACECRAFT Okay, 5.7..

PAO Everything going smoothly in the countdown as we prepare for an ontime lift off at 7:19 a.m. eastern standard time this morning. The countdown clock at T-29 minutes 12 seconds and counting. This is Shuttle launch control.

SPACECRAFT ...pressure

KSC ECL

SPACECRAFT This is ECL

KSC Could I have your reading on the DPDP 0.004

SPACECRAFT Okay Kevin vent is about to begin, it will be vented into the Orbiter payload bay.

END OF TAPE

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KSC The countdown clock at T-29 minutes 12 seconds and counting. This is Shuttle Launch Control.

SPACECRAFT Launch pressure.

SPACECRAFT ECL.

DPDP 0.004? This is TCL. Could I have your readings on the

SPACECRAFT Kevin vent is about to begin. It will be vented into the Orbiter payload bay CDR.

thank you.

Okay, open the cabin vent please.

SPACECRAFT Didn't work

DPD OTC

SPACECRAFT DPD 539. 539 complete, verify.

And OTC cabin vent procedure complete.

Thank you. TCR you got any problems?

Yes I can verify the talk backs, no problem.

SPACECRAFT Okay thank you. Go ahead

DPD OTC

SPACECRAFT DPD

Go ahead and fire up your pick rack.

SPACECRAFT Okay (garble)

SPACECRAFT OTC is DPD 5.5, 5.6 and 5.7 complete

Okay GLF

SPACECRAFT GLF go.

Okay 544.

SPACECRAFT I confirm that's complete.

Thank you.

Okay, (garble) CDR PLT and MS 1 and 2 standby to

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(garble) the final air to ground voice checks.

SPACECRAFT Roger.

KSC This is Shuttle Launch Control T-25 minutes and counting. The cabin leak checks have been completed and the cabin vents opened by Commander Vance Brand. Presently air to ground voice checks are being conducted between the astronauts and Mission Control in Houston. The NASA test conductor has asked to be notified when all nonessential personnel have cleared the launch danger area road block.

SPACECRAFT Go ahead.

KSC We are coming up on another built in hold, this is a 10 minute built in hold which occurs at the T-20 minute point in the countdown.

Columbia, just a little wait (garble).

KSC The closeout crew which had been preparing the first the cabin of the Orbiter for the crew and then prepared the axis arm to be retracted from the vehicle has reached the road block. They've brought the elevators down to the base of the pad and secured them. Everything going smoothly in the countdown. The clock at T-24 minutes and counting. This is Shuttle Launch Control.

320 at 25, 070 at 15, and the surface 090 at 5 knots. Altimeter 30.02 going a right overhead at KSC 15 and as a reminder we'll also be AOA to KSC today and these winds should be good for the AOA.

SPACECRAFT Okay, copy that, thank you.

CAPCOM Columbia, this is Houston, recheck altimeter 30.20

SPACECRAFT 30.20

CAPCOM That's confirm. And I've got a couple of words here for you about the procedures on the CRTs. The fail to sync here is, we have three specs that are really susceptible to the fail to sync. That's on spec 0, 1 and 2 and during OPS 9 we have an additional spec, spec 104, and if you have these specs on two CRT's simultaneously that gives us a high susceptibility to fail to sync. Also note that you were previously briefed that the launch (garble) display came into this, that is not correct, the launch (garble) is clean, and you can have it up on whatever CRT's you need it.

SPACECRAFT Okay and how about spec 0?

CAPCOM Spec 0 is one that is susceptible to the fail to sync, that's specs 0, 1 and 2.

SPACECRAFT Okay, good.

CAPCOM And Vance the winds, the increase in the winds, you're going to be able to see that on your ascent indications, we're looking at 70 seconds to expect about a 3.8 degree per second roll rate as your peak roll rate and about an 8 degree roll (garble).

... to DPS thank you.

SPACECRAFT Okay, glad to know that.

CDR and PLT and (garble) the countdown clock will hold at approximately one minute and 30 seconds for a 10 minute duration at T-20 minutes.

SPACECRAFT (garble) to hold.

Thank you.

(garble) DPS.

SPACECRAFT Go ahead DPS. We need step 562 verified.

SPACECRAFT We are verify on CRT3 CDR's the FDFS (garble) with item 25 no answer.

That's CDR, that's verified, CRT3PFS memory
(garble)

PAO This is Shuttle Launch Control T-21 minutes and counting. The primary computer programs are presently being transferred to the backup computers in the Orbiter in order for both systems to have the same...

END OF TAPE

That's CDR, that's verified. CRT 3 PFS memory
(garble)

KSC This is Shuttle Launch Control T-21 minutes and counting. The primary computer program was presently being transferred to the backup computers in the Orbiter in order for both systems to have the same information. In case the prime computer fails during flight, the backup would take over control of the Shuttle vehicle.

Correction, would you close the cabin vent valve.

KSC The Orbiter test conductor has asked Commander Vance Brand to close the cabin vent valves once again. We're coming up on the, one of two remaining builtin hold periods. This is a 10-minute builtin hold. About 20 seconds away from that hold.

And CDR reports close vent valves procedure complete.

KSC We're about 10 seconds away now from the builtin hold of 10 minutes.

KSC The crew has been informed that if an abort should be necessary they will return to the Kennedy Space Center and we're at T-20 minutes and holding. This is a 10 minute builtin hold, with all computers in the firing room, or control room, are configured with proper programs for the final portion of the countdown. At the time that we come out of the hold, the onboard computer will be changed over to the flight program. Also during this hold the inertial measuring units preflight alignment will be completed.

(garble)

Go ahead.

KSC The STS- 5 flight is unique in many ways. It's the first operational mission for the Space Shuttle. The first four flights were considered development flights. Now the Shuttle is taking the first steps to paying it's own way by carrying communications satellites for Satellite Business Systems and Telesat Canada, that country's domestic satellite communications corporation. The two companies are paying more than 17 million dollars for this flight. This will also be the first Shuttle mission in which the astronauts will leave the cabin area to go out into the cargo bay during flight. The two mission specialists, Dr. William Lenoir and Dr. Joe Allen, will spend approximately 3 and 1/2 hours outside of Columbia's cabin. Their primary objective is to test their ability to move around the cargo bay and do useful work. They feel that their

ability in this area will be greatly enhanced by the knowledge accumulated previously during the Gemini and Apollo and Skylab programs. Two of the lessons learned on those programs was that a positive method of moving from place to place must be provided otherwise the astronaut expends too much energy. And that if useful work is to be done then restraints must be provided to keep the astronaut in the proper position to do that work. We are in the 20 minute built-in hold and have about 9 minutes remaining in that hold. Everything has gone very smoothly at this point and the NASA test director is in the process of having the people who will be monitoring the final part of this countdown switch from the many channels that they have been on to just one channel so that they remain together and hear, all hear the same things during the remaining part of the countdown. The countdown clock at T-20 minutes and holding. This is Shuttle Launch Control.

SPACECRAFT All set.

Okay, BTC and PBC and OTC are you on?

OTC, copy.

(garble)

Okay MPD. If we do have a hold is given to the countdown clock. The clock will go to the next CLS milestone prior to stopping. And according to those milestones are 9754 255 157 and 31 seconds. For STS-5 the total hold time at T-9 is 33 minutes which is our total launch window. Okay, after we pick up the countdown clock at T-9 and prior to reaching T-31 seconds. Our maximum hold time is 7 minutes due to VOX drain back and APU run time. After 31 seconds no hold is available, only cutoff. At the start of the talk at T-9 and we picked up on an even GMT, however any hold after GLS start the countdown clock will be picked up immediately following the problem from resolution. And in this case a NO GO a NO GO survey of the elements will be asked and the pickup of the countdown clock will lag the MPD mark by about 3 seconds. A GO at 9 indicates that all elements are free of any problems that would give us a successful T 0. So that means, if element is NO GO, if a problem exists, even though it can be resolved prior to T 0. Okay, once we pick up the count clock at T-9 and it exceeds the hold limits, there can be no recycle for launch today, due to the fact that recycle time exceeds the 33 minute launch window. LCC violation should be reported as trend is seen and not wait until the redline is broken. And PLT at T-5 do not start the APU's until you hear GO for APU start. We want to...

END OF TAPE

...and due to the fact that the recycle time exceeds the 33 minute launch window. LCC violation should be reported as soon as trend is seen and not wait until the redline is broken. And PLT at T-5, do not start the APU's until you hear GO for APU start. We want to preclude a possibility of having the clock stopped and you go ahead starting the APU's. And all crews for now who are not active have an active, part in the OMI please monitor OIS channel 217. Are there any questions? I have a few words to say at T-9 CDR and PLT having to do with the backup OIS channel. Any questions?

SPACECRAFT No questions, so far.

Thank you. Okay, SCE, have you briefed the crew on the CRT?

Okay, (garble) we'll have CP brief that.

Okay, in order to prevent a reoccurrence of IPR 667 which is the DPC 2 failed to sync which occurred second shift last night. We have the following restrictions on following up CRT displays. In OPS mode G9, we will not have the GPC memory, DPS utility, the time spent or the IMU control monitor display on more than one CRT at a time. You are allowed any combination of these displays but no more than, no more than 1 display of the
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same display up at 1 time. In OPS mode G1 this restriction only applies to the GPC memory display? Are there any questions?

SPACECRAFT (Garble) no questions, we understand.

Okay, MPD all personnel except the Orbiter personnel report back to channel 232 at this time. That's all personnel except the Orbiter personnel, report back to channel 232. COI EOTC.

(garble)

(garble) logic inhibits. Do you want to kick it off?

SPACECRAFT Yes, that's complete. Okay, that's 21 22 and 23.
Affirmative.

Fuel cells OTC.

SPACECRAFT Fuel cells go.

are you picking up with your purge?.

SPACECRAFT We will pick up with the purge immediately coming

out of the hold. Understand.

Okay, all personnel after transition to OPS 101 discontinue (garble) reads for the remainder of the countdown.

(garble)

(garble)

SPACECRAFT And IDP for our alignment is complete, ready for OPS transition and step 618 is complete.

Okay, copy. Thank you. And DPS, I believe, you had a (garble).

(garble) that's good DPS, we'll put that in.

Thank you. (garble)

KSC This is Shuttle Launch Control at T-20 minutes and holding. We're just about 2 and 1/2 minutes away from picking up the countdown at the T-20 minute point. At the present time the NASA test director, Norm Carlson, is asking each of the test conductors to verify that they are go to resume the count and

each of them have given that go. The crew has been briefed and some procedures to follow in using their computers onboard in their display systems. When we do a status check, all of the various test conductors confirm that their systems are ready to resume.

KSC The landing convoy is confirmed that it's ready to support the launch along with all of the possible landing sites. The chase plane pilots have been ordered to man their planes. We're just about a minute and 30 seconds away from picking up the countdown once again. The landing recovery director has informed the crew that if they should have a return to launch site abort the vehicle would land on runway 15. And it is also reported that the landing facility is ready to support the launch.

DPS give me an audible when I can take the

KSC They're just about a minute away now from picking up the countdown once again. Looking for an on time launch at 7:19 a.m. Eastern Standard Time this morning. The two satellites onboard Columbia are similar in size and shape but different in other ways. ANIK, owned by Telesat Canada, is designed for broadcast of pay television and other television shows, long distance telecommunication and many services, the world's most

powerful domestic communication satellites and capable of delivering high quality television pictures to Earth terminals within antennas as small as about 4 feet in diameter, 1.2 meters. It can carry 2 full color TV transmissions on each of 16 channels. The Satellite Business Systems satellite provides private telephone computer data, electronic mail and teleconference ...

END OF TAPE

PAO pick 1.2 meters. It can carry two full color TV transmission on each of 16 channels. The satellite business system satellite provide private telephone computer data electronic mail and teleconferencing for large business organizations. We're coming up on the

KSC 5,4,3,2,1

PAO count

KSC mark

PAO T-20 minutes and counting. Both satellites weigh approximately 7200 pounds along with their propulsion assist module called a PAM, at the time of ejection from the Shuttle. They're about 7 foot in diameter and 21 feet tall when deployed while they're in the cargo bay they telescope down to 9 and a quarter feet high. As we came out of the hold the computer transition to OPS 101 has been made. OPS 101 is a computer program used for ascent of the space Shuttle in to orbit. At that point the prime computer will be dumped and compared with the onboard computers to verify that it has a proper configuration launch. We're T minus 19 minutes and counting and the purge of the 3 fuel cells is under way. The countdown continuing very smoothly. The clock at T minus 18 minutes, 55 seconds and counting. This is Shuttle Launch Control.

SPACECRAFT Okay, CTRs and what. CRTs and what? OTC CTR.

KSC Go ahead CTR.

SPACECRAFT As (garble) OPS 1 lowered by DU (garble) and we cleared the DU GMC's spec 99 on pass.

KSC DPS have any objection to that?

Repeat that please.

KSC He wants to know the spec 99.

Sure thing. After he verifies the (garble) spec.

SPACECRAFT Sounds good. Verified that (garble)

Okay.

(garble) DPU.

Go ahead DPU.

Step 641, T minus 20 minutes (garble) in progress.

Okay, clear the way for 650.

We'll pick that up in just a second.

PAO This is Shuttle Launch Control. T minus 17 minutes and counting. During this period the flight crew is configuring the computer for comparison tests. They have also been checking the horizontal situation displays. A gimbal check of the main propulsion system is performed at this point too. A gimbal simply means that the engines are moved from side to side to insure that they can steer the vehicle properly during the flights. The countdown clock at T minus 15 minutes, 30 seconds and counting. This is Shuttle Launch Control.

KSC (garble)

SPACECRAFT Go ahead GMC.

KSC Can you verify spec 649.

SPACECRAFT Okay, thank you.

SPACECRAFT Okay, OTC CTR.

KSC Go ahead.

SPACECRAFT (Garble) OPS 1 is complete and we have two messages, an NSP and a MPS special.

SPACECRAFT NSP is powered down.

KSC Okay, PLT OTC.

SPACECRAFT (garble)

KSC (garble) will you perform the MPS helium reconfiguration please.

SPACECRAFT Okay.

SPACECRAFT OTC DPU.

KSC Go ahead DPU.

SPACECRAFT You have 648 and BFS is now ready for (garble)

KSC Okay, should be in work by the way.

COOF, OTC.

(garble)

Okay. We're going to do this (garble) right.
Right.

Okay.

We'll close (garble) by the clock.

SPACECRAFT OTC PLT. MPSU reconfiguration complete.

KSC 677. OTC copy, thank you. (garble) if you can pick up

PAO This is Shuttle Launch Control at T minus 15 minutes and counting. The board advisory checks are underway again. This is the system which is used to inform the crew of problems and the necessity of aborting a mission if that should occur. The cross vent valves between the orbital maneuvering system and the remote control system are also being configured for launch. All of the test support members have been told and verified that they are go for launch. The chase plane pilots have been ordered to start their engine. The countdown continuing at T minus 14 minutes 28 seconds and counting. This is Shuttle Launch Control.

SPACECRAFT I confirm that all three cross vents are closed.

KSC Okay, Bill. Okay CTR and overhead (garble) earth helium pressure B switch open.

SPACECRAFT B switch coming open. Mark. Talkback is now open.

KSC Thank you. Double S you're going to monitor.
Double S copy.

KSC Okay, PLT would you report RCS quantities please.
OTC CSVP.

KSC SCB you kick off your...

END OF TAPE

SPACECRAFT Yea, Double S you going to monitor.

SPACECRAFT Double S, copy.

CAPCOM Okay, PLT would you report RCS quantities please?

SPACECRAFT RTC CSIP.

CAPCOM SIP you kick off your purge.

SPACECRAFT Yea, (garble) is complete 17 dash 1699.

CAPCOM PLT will you give me the RCS quantities please?

SPACECRAFT Standby till I get a (garble) here.

CAPCOM Okay.

SPACECRAFT Okay, going down the line on the forward, left and right off the CRT. Forward oxidizer 93, fuel 96. Left oxidizer 107, fuel 106. Right oxidizer 108, fuel 106. Ohms showing 4190 on the helium each one.

PAO This is Shuttle Launch Control. T minus 13 minutes and counting. We're coming up on another built in hold at the T minus 9 minute point in the count. The NASA test director will be conducting a poll once again of the major managers to verify that they are ready. During the past couple of minutes the solid booster test conductor ordered the gaseous nitrogen purge turned on in the aft portion of the solid motor. This will continue up to engine ignition. We also have verification from the DOD contingency support group that they are ready for launch with emergency aircraft personnel on their stations. The NASA test conductor has just polled the launch team once again, and all members of the team, including launch director L. O'hara, and the astronauts have given a go. Coming up on the 12 minute point in our countdown. There are three student science experiments on board the Space Shuttle for this mission. The Shuttle Student Involvement program is a nationwide program which is sponsored by the National Science Teachers Association and NASA. The three experiments were selected from hundreds of high school finalists across the country. All three of the students are presently college freshman. Michelle Isel from Wallingford, Connecticut has designed an experiment to determine whether weightlessness eliminates the cause of malformation in crystals. The triglycene sulfate she is using is a candidate for infrared sensors on satellites. Hamilton Standard, who built the space suits for the extravehicular activity, is the sponsor for Michele. Scott Thomas of Johnstown, Pennsylvania is studying the process of convection in zero gravity to see if surface tension of a fluid plays a major role

in this heat transfer process. The Firecoal Corporation is sponsoring him. And Aaron Gilett of Winterhaven, Florida, sponsored by Martin Marietta, Orlando, will find out how Zero G affects the regeneration of sponge cells. The countdown clock continuing at T minus 10 minutes, 32 seconds and counting. This is Shuttle Launch Control.

TASC (garble)

(garble)

SCASC. Verify 718.

That's verified.

Thank you.

Go ahead EP.

698 complete. Okay.

Be advised of the countdown clock will hold in approximately 1 minute. (garble) DPU.

Go ahead DPU.

Yes, step 709 and 710 are verified to T minus 20 minute dump compare, complete and we (garble).

I copy.

Thank you.

PAO This is Shuttle Launch Control at T minus 9 minutes, 30 seconds and counting. The flight crew has closed the vent valve on the crew cabin and the cabin pressure has been verified. The comparison of the prime computer with the onboard computer has been completed and is satisfactory. All aerosurfaces and actuators on the orbiter are presently in the proper configuration for the auxillary power unit to start at the T minus 5 point. We're coming up on the beginning of another final 10 minute build in hold T minus 9 minutes and holding. This is a 10 minute build in hold. When we come out of this hold we will go directly down to 7:19 and launch. During this hold, the launch team is briefed on the the way in which a halt can be called to the countdown. During the final 9 minutes of count, a hold can be called by the NASA Test conductor, The Orbiter Test Conductor, the Flight Crew, the Flight Director as well as the

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Range Safety Officer. Have approximately 9 minutes remaining in this hold. Everything going smoothly up to this point. This is Shuttle Launch Control.

Okay, understand. Good news. Ten TOP copy that.

END OF TAPE

Okay, understand. Good news. And PLT copied that.

PAO This is Shuttle Launch Control at T minus 9 minutes and holding. We have approximately 7 minutes remaining in this hold. When we come out of the hold we have several major milestones remaining in the count. As we come out of the hold the ground launch sequencer located in the firing room integration council will take over command of the remaining events as well as monitoring the response of the various shuttle systems. At T minus 25 seconds, the flight computer redundant set launch sequencer takes over on board the orbiter and checks that no launch commit criteria will be violated during the remaining seconds of the count. At T minus 5 minutes, the auxillary power units will start. To turn on the auxillary power units, the astronauts must throw 9 switches. One switch for each of the three auxillary power units opens the propellant isolation valve. Three switches start the auxillary power units, and the final three switches allow the gear boxes to be pressurized and begin pumping the hydraulic fluid. In the past, the astronauts monitored the pressure changes after each sequence of switches but since then the countdown, or the pressurization, has been monitored here on the ground. Since the countdown can be automatically halted at T minus 4 minutes if one switch has not been thrown, the astronauts now simply throw all of the switches as fast as possible. At T minus 4 minutes a purge of the main engines will start. At T minus 2 minutes and 55 seconds, pressurization of the liquid oxygen tank will begin and at 1 minutes, 57 seconds, the liquid oxygen valve will be closed. We have just heard from the Range Safety Officer that there is a ship in the impact area of the (garble) where the solid rocket boosters will impact and so there is a no go from the Range Safety Officer at the present time. We are in the process of going through a countdown of status checks to see if we are ready to resume the count and go for launch. Following ignition of the solid motors and liftoff, the vehicle will take approximately 7 seconds to clear the tower. At that point the shuttle velocity will be greater than 100 feet per second and increasing. When the velocity reaches 121 feet per second the vehicle will begin to pitch over followed by a roll maneuver to align it properly with the flight azimuth. At 67 seconds into the flight, the vehicle will encounter the greatest structural loads on it. Prior to that the crew will throttle down the main engine thrust to 85 percent to keep the dynamic pressure low. After the vehicle is through the max qe region, the crew will increase the thrust back to 100 percent. At approximately 2 minutes into the flight, the solid rocket boosters chamber pressures will drop below 50 pounds per square inch and the separation sequence will start. And the main engines will continue to burn for 8 minutes and 35 seconds and the external tank be separated 21 seconds later. At that point the orbiter will be at an altitude of approximately 60 nautical miles. We have approximately 4 minutes

PAO (garble) the launch sequence are now being controlled by the ground launch sequencer from now up until m-25 seconds when they switch to the onboard redundant SEP launch sequencer. The ground launch sequencer is part of the launch processing system and operates by relaying commands to the Orbiter's onboard computers which then report back to the launch processing system that the commands have been executed. The primary job of the computers is to check that all of the launch commit criteria such as propellant loads, temperatures, pressures, and other measurements are proper. The launch and recovery director has ordered the chase plane to take off.

PAO Coming up on the 8 minute point in the countdown.

KSC (garble) verify that the 2 stage buffer is executed, the SPC is onboard.

SPACECRAFT (garble) sensors are monitored (garble)

PAO T-8 minutes and counting. Everything proceeding smoothly for an ontime liftoff at 7:19 am this morning. The liquid oxygen fill and drain valve in the external tank has been closed and topping of the tank completed. Liquid oxygen drain bank has been started. This means that liquid oxygen is being flowed through the main compulsion system to cool the engines down slowly to about 270 deg below 0 so that they'll not be shocked by the torrent of super cold fluid at the time of the engine ignition. T-7 minutes, 25 seconds and counting. At the 7 minute point, the crew access arm will be retracted.

KSC Okay. All crewmembers are verified seats in launch positions.

SPACECRAFT (garble) verified.

SPACECRAFT (garble) verified PLT.

KSC Go for OAA retract.

PAO We have a go for the retraction of the access arm. T-6 minutes 52 seconds and counting. The access arm is the walkway used by the astronauts to get from the service structure to the Orbiter. If an emergency should arise, the tower can be put back in position within 15 seconds. The crew is verified that their seats are in launch position.

KSC KRPS OTC

SPACECRAFT (garble)

PAO T-6 minutes, 30 seconds and counting. At the 6 minute point, the crew will perform the prestart of the APU's or

auxilliary power unit.

KSC (garble) would you perform your APU prestart please.

SPACECRAFT (garble)

PAO The pilot has been asked to perform the prestart on the APU, Pilot Bob Overmyer. This consists of positioning a number of switches and verifying they are in the proper position. T-6 minutes and counting.

PAO Then the Pilot throws the 3 propellant isolation valve switches which allow the hydrazine fuel to start flowing from the tanks toward the APU's. Prestart is complete. T-5 minutes, 40 seconds and counting.

KSC Okay. Flight OTC.

SPACECRAFT This is Flight.

KSC Transmit the FM150.

PAO T-5 minutes, 30 seconds and counting.

PAO The development flight instrumentation recorders are on. They provide measurements and temperatures, pressure, and physical stresses on the Orbiter. The recorder store this information for playback after landing. T-5 minutes, 15 seconds and counting. The Orbiter flight recorders are on. Coming up on the 5 minute point and start of the auxilliary power units. This is a major point in the countdown. T-5 minutes and counting and we have a go for APU start. APU start is complete. The APU's provide hydraulic power to move the (garble) surfaces and main engines for steering. T-4 minutes, 39 seconds and counting. T-4 minutes, 30 seconds and counting. The firing circuits for the solid rocket booster is ignition and range safety destruct devices have been armed by a switch called a safing arm device. The system is then inhibited to prevent premature ignition. T-4 minutes, 15 second and counting. The main fuel valve heaters have been turned off in preparation for engine start. The main engines on the Orbiter will actually be started at 6.8 seconds and it takes 3 seconds for them to reach 90 percent thrust. T-3 minutes, 55 seconds and counting. The crew has been asked to close their visors. The final helium purge of the Orbiter's main engines has started to ensure that there is no surplus hydrogen or oxygen in the area at the time of ignition. T-3 minutes, 40 seconds and counting. The elevon speed brake and rudder are being moved to a preprogrammed pattern to insure that they are capable of doing their job during the flight. T-3 minutes, 30 seconds and counting. The Shuttle is now on internal power; however, the fuel cells are still receiving their fuels from

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ground support equipment for another minute. T-3 minutes, 17 seconds and counting. The engine gimbal or movement check of the main engines of the Orbiter is underway to insure that they are ready to control the flight. Coming up

END OF TAPE

KSC The elevon, speedbrake and rudder are being moved through a preprogrammed pattern to ensure that they are capable of doing their job during their flight. T-3 minutes, 30 seconds and counting. The Shuttle is now on external power, however the fuel cells are still receiving their fuels from ground support equipment for another minute. T-3 minutes 17 seconds and counting. The engine gimbal or movement check of the main engines of the orbiter is under way to ensure that they are ready to control the flight. Coming up on the 3 minute point. T-3 minutes and counting. Everything is going smoothly. T-2 minutes, 55 seconds. The liquid oxygen valve for filling the external tank is closed and pressurization has begun. After the tank is pressurized the hold capability is limited to 3 minutes and 36 seconds. T-2 minutes 30 seconds and counting. The gaseous oxygen vent arm, will be retracted shortly. T-2 minutes 30 seconds and counting. The fuel cells ground supply of oxygen and hydrogen has been terminated and the vehicle is now on its onboard supply, and the gaseous oxygen vent arm is being retracted lifting off of the nose of the external tank. T-2 minutes, 10 seconds and counting. The main engines have been moved to their start position and the astronauts have curved the caution and warning memories of their onboard computers and verified that there are no unexpected errors. One minute 57 seconds, the liquid hydrogen vent valve has been closed and flight pressurization is under way. One minute, 35 seconds. The computer will automatically verify the readiness of the main engines at the T-1 minute point. Coming up on 90 seconds, T-90 seconds and counting. Everything is going smoothly as we look for a lift off of STS-5. T-1 minute, 20 seconds and counting. The liquid hydrogen tank now is at flight pressure. Coming up on the 1 minute point in our countdown. T-1 minute and counting, the firing system for the sound suppression system on the pad is armed. T-55 seconds, the hydrogen igniters under the orbiter's engines have been armed. These devices are used to ensure that any hydrogen flowing through the engines prior to ignition does not accumulate, causing a small explosion. T-40 seconds, we're just seconds away from switching command of the countdown from the ground computers to the onboard computers. And the SRB development flight instrument recorders are on. And we have an go for auto sequence start. T-21 seconds and counting. The SRB nozzles are being moved through a test pattern to launch position. T-15 seconds, 13, 12, 11, 10, we are go for main engine ignition. 6, we have main engine ignition, 3, 2, 1 and solid motor ignition and lift off. Lift off of the first operational space shuttle mission with two satellites onboard and the Shuttle has cleared the tower.

SPACECRAFT (garble) space program

Roger (garble) Columbia

KSC Houston now controlling. Mission Control confirms

roll maneuvers started. 20 seconds thrust looks good. 26 seconds roll maneuver completed. 30 seconds, Columbia now 1 nautical mile in altitude throttling engines down to 85 percent as programmed. Mark 40 seconds, Columbia now 2 and 1/2 nautical miles in altitude, 1 nautical mile downrange. Mark 50 seconds coming up now in (garble) maximum aerodynamic pressure on the vehicle. 55 seconds, Columbia now 4 and 1/2 nautical miles in altitude. Mark 1 minute past through (garble) still looking good, throttling engines back to 100 percent, given a go at throttle up.

CAPCOM Columbia, this is Houston, you have a go at throttle up.

SPACECRAFT Roger. A go at throttle up.

KSC Mark 1 minute 10 seconds, Columbia now 7 nautical miles in altitude, 5 nautical miles downrange. Mark 1 minute, 20 seconds, Columbia now 10 nautical miles in altitude miles in altitude, 7 nautical miles downrange.

CAPCOM Columbia, Houston we're monitoring a slightly depressed trajectory expected because of the headwinds.

SPACECRAFT Roger. Understand.

KSC One minute 35 seconds, that was CAPCOM Bob Stewart advising the crew of a slight depression because of the headwind. Columbia moving out now as preplanned on three good engines. One minute 45 seconds, Brand, Overmyer, Lenoir and Allen are now coming in to the last traces of the Earth's atmosphere. Columbia now 19 nautical miles in altitude, 18 nautical miles in our range. Mark 2 minutes, standing by now for solid rocket booster separation and...

END OF TAPE

PAO One minute 45 seconds. Brand, Overmeyer, Lenoir, Allen now coming into the trace of the earth's atmosphere. Columbia now 19 nautical miles in altitude 18 nautical miles downrange. Mark 2 minutes. Standing by now for solid rocket booster separation confirmation.

CAPCOM Roger PC.

PAO Columbia now 25 nautical miles in altitude. 2 minutes 15 seconds. Confirm solid rocket booster separation. 2 minutes 22 seconds. Onboard guidance system verging as programmed. Columbia is now steering for a precise one on space for main engine cutoff. 31 nautical miles in altitude 43 nautical miles downrange.

CAPCOM Columbia, this is Houston. Your first stage was a low (garble) at this point.

SPACECRAFT Okay, fine.

PAO 2 minutes 49 seconds. Columbia now 37 nautical miles in altitude 58 nautical miles downrange. Velocity now reading 6500 feet per second. Mark 3 minutes. 3 minutes 5 seconds. Columbia now standing by for 2 engine TAL.

CAPCOM Houston, you have 2 engine TAL capability.

SPACECRAFT 2 engine TAL capability.

PAO 3 minutes 15 seconds. That call up by CAPCOM, Bob Stewart, says that Columbia now has landing capability at Dakar airport should one engine go out. 3 minutes 25 seconds. Columbia now 46 nautical miles in altitude, 88 nautical miles downrange. 3 minutes 32 seconds. Return status check in mission control by flight director, Tom Holloway. The crew aboard Columbia given the go to continue 3 minutes 40 seconds. Columbia now 49 nautical miles in altitude 105 nautical miles downrange. Standing by now for negative return.

CAPCOM Negative return. Mark, negative return.

SPACECRAFT Negative return.

PAO 3 minutes 56 seconds. With that call up Brand, Overmeyer and company committed to space travel they can no longer turn around and return to launch site. Mark, 4 minutes 5 seconds. Columbia now 52 nautical miles in altitude, 132 nautical miles downrange. Columbia now traveling at a velocity of 8900 feet per second. Mark, 4 minutes 30 seconds. Trajectory plots in mission control still on target for Columbia. Brand, Overmeyer, Lenoir, Allen swiftly moving downrange now. Now 50 or 174 nautical miles downrange. Mark, 4 minutes 50 seconds.

Columbia now 57 nautical miles in altitude, 192 nautical miles downrange. Velocity now reading 10,500 feet per second.

CAPCOM Columbia, Houston, you're go at 5 minutes.

SPACECRAFT Roger, go at 5 minutes.

PAO Mark, 5 minutes 10 seconds. Columbia now 58 nautical miles in altitude, 222 nautical miles downrange. 10 minutes up. Standing by for press to MECO.

CAPCOM Columbia, you have press to MECO.

SPACECRAFT Roger, press to MECO capability.

PAO 5 minutes 44 seconds. A press to MECO call from CAPCOM, Stewart says should Columbia lose but 1 engine, press on, keep flying forward. Columbia's engines have enough energy to achieve normal altitude and velocity at cutoff. 5 minutes 58 seconds. Columbia now 59 nautical miles in altitude, 307 nautical miles downrange. Velocity now reading 13. Standing by for a single engine TAL.

CAPCOM Columbia Houston, you have single engine TAL capability.

SPACECRAFT Roger.

PAO 6 minutes 15 seconds. That report from CAPCOM Stewart indicates if a 2 engine failure occurred crew aboard Columbia is capable of an emergency landing at Dekar airport. Mark 6 minutes 25 seconds. Columbia now 59 nautical miles in altitude, 360 nautical miles downrange. Velocity now reading 15,400 feet per second. Mark 6 minutes 40 seconds. Columbia pitching over now, diving to increase velocity level off altitude giving Columbia more favorable attitude. Columbia now 59 nautical miles in altitude. 6 minutes 55 seconds. Columbia's pass still down the middle of the displays mission control. Columbia now 59 nautical miles in altitude, 445 nautical miles downrange. Velocity now reading 17,900 feet per second. 7 minutes 12 seconds. Standing by for single engine press to MECO.

CAPCOM Columbia, you have a single engine press to MECO capability.

SPACECRAFT Copy.

PAO 7 minutes 25 seconds. That report says Brand and Overmeyer can achieve...

END OF TAPE

SC 7 minutes, 12 seconds.

JSC Standing by for single engine press-to-meco.

CAPCOM Do you have single engine press-to-meco capability.

SPACECRAFT Copy.

JSC 7 minutes 25 seconds. That report says Brand and Overmyer can achieve normal engine cutoff target even if two engines go out. Columbia now 58 nautical miles in altitude, 535 nautical miles down range. Mark 7 minutes 40 second, G force is building for Brand, Overmyer, Lenoir, Allen now. Coming up to three g's. Columbia now 58 nautical miles in altitude, 584 nautical miles down range. Columbia's three main engines slowly being throttled back now. Should be throttled at 65 percent at 6 seconds before main engine cutoff, 8 minutes. Flight dynamics officer, Ron Epps reports Columbia has velocity of 23 thousand feet per second. 8 minutes 12 seconds, Columbia now 59 nautical miles in altitude, 675 nautical miles down range. Velocity now reading 24,400 feet per second. Mark 8 minutes 25 seconds standing by now for main engine cutt off.

SPACECRAFT Stu, we've got a good MECO.

CAPCOM We copy. Good MECO, Columbia.

JSC Confirmed shutdown, Columbia now in space for a fifth time. This time with a four man crew standing by now for external tank separation. Columbia now 795 nautical miles down range. GO-NO-GO status check in mission control by flight director Tom Holloway for the first OMS burn and shutting down the auxilliary power units. Confirming external tank separation. Columbia now performing an evasive maneuver. Moving below and beyond the external tanks.

CAPCOM Columbia. This is Houston, you read go on a nominal OMS 1 burn, APU shutdown on time.

SPACECRAFT Nominal OMS 1, APU shutdown on time.

JSC Mark (garble) minutes, 25 seconds, that was CAPCOM Bob Stuart advising the crew aboard Columbia they are given a go for the first OMS burn on time and nominal. Mark 9 minutes and 40 seconds. Columbia now 1,015 nautical miles down range. Mark 9 minutes 55 seconds, Columbia now maneuvering OMS 1 burn attitude using two, six thousand pounds thrust engines, OMS 1 will be posigrade moving Columbia forward on and high on her flight pass. 10 minutes 44 seconds prop systems engineer in the control center confirms the OMS 1 burn has started two good engines.

CAPCOM Columbia. Houston. 30 seconds to LOS. We see two good engines burning on the OMS 1, we're observing the water spray boiler 1A problem and if it gives you a problem, just switch over to the B.

SPACECRAFT We copy that water spray boiler 1 if its gives me a problem go to the other one.

CAPCOM That's affirm. 10 seconds to LOS, configure LOS, we'll talk to you at Dakar.

SPACECRAFT Roger, configure LOS.

PAO Shuttle Control Houston. 11 minutes 36 seconds mission elapsed time. We have loss of signal now with Columbia through Bermuda. The next station to acquire will be Dakar in approximately 6 minutes. This is Shuttle Control Houston.

PAO This is Shuttle Control Houston. 13 minutes 53 seconds mission elapsed time. We have a status report on the first OMS burn from flight dynamics officer, Ron Epps. The time of ignition was 10 minutes 30.8 seconds, the delta V read 231.5 feet per second. Burn duration 2 minutes 20.8 seconds. OMS 1 resulted in a apagee of 160 nautical miles, a paragee of 50.7 nautical miles. Meanwhile a report in mission control that the water boiler on number 1 appears good, it's believed that a, there's a quantity transducer instability which gave the reading reported earlier. We're at 14 minutes 50 seconds, mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control Houston. 16 minutes 40 seconds mission elapsed time. Less than a minute away from reacquiring Columbia through Dakar. We'll stand by and monitor the air-to-ground conversations between CAPCOM, Bob Stuart and the crew aboard Columbia. This is Shuttle Control Houston.

END OF TAPE

SPACECRAFT (garble)

PAO This is Shuttle Control Houston, 16 minutes 40 seconds from Mission Elapsed Time, less than a minute away from reacquiring Columbia through Dakar, we'll stand by and monitor the air to ground conversations between CAPCOM Bob Stewart and the crew aboard Columbia. This is Shuttle Control Houston.

PAO Shuttle Control Houston, 18 minutes, 20 seconds Mission Elapsed Time. Not receiving telemetry data through the Dakar

CAPCOM Columbia, this is Houston with you through the Dakar.

PAO On the ground computer problem, at Dakar, not receiving telemetry. However, you heard the call from CAPCOM Bob Stewart.

CAPCOM Columbia, Houston through Dakar.

SPACECRAFT Roger, loud and clear, how do you read?

CAPCOM Oh, got you loud and clear now. We don't have a S-Band problem here at Dakar, so Jim will check your call.

SPACECRAFT Okay, we'll do it right now, anyway.

CAPCOM Columbia, this is Houston, we do have data now, and we'll watch your Gimbal check.

SPACECRAFT Okay, it's on secondaries now.

PAO 19 minutes, 14 seconds, now receiving telemetry data through Dakar.

SPACECRAFT Bob just has for your information, the ET umbilical and doors are closed.

CAPCOM Copy, the umbicals are closed.

CAPCOM Columbia, this is Houston, we're getting patchy data through Dakar, we weren't able to observe your gimbal check, but your go for nominal OMS 2 burn.

SPACECRAFT Okay, just a nominal OMS, and we're maneuvering there

CAPCOM Columbia, this is Houston, we're 25 seconds to LOS check your configuration LOS, we'll have a short pass at Botswana, 37 seconds with probably no contact, we'll talk to you at Yarragadee.

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SPACECRAFT Okay, copy, and we're doing, the-configuring the LOS.

PAO Shuttle Control Houston, 23 minutes 38 seconds, Mission Elapsed Time. Loss of Signal now with the crew aboard Columbia through Dakar. The next station to acquire will be Botswana, however, that is a very short pass of some 37 seconds in duration. We'll stand by and see if we have any voice contact, the station following Botswana is Yarraqadee. This is Shuttle Control Houston, at 24 minutes 8 seconds Mission Elapsed Time.

PAO This is Shuttle Control Houston, 24 minutes 50 seconds Mission Elapsed Time...

END OF TAPE

PAO ...is Yarragadee. This is Shuttle Control, Houston at 24 minutes, 8 seconds Mission Elapsed Time.

PAO This is Shuttle Control, Houston. Twenty-four minutes, 50 seconds Mission Elapsed Time. Because this was the first operational mission of the Space Shuttle Columbia, no heart rate monitoring took place on the 4 crewmembers during the launch phase of flight. We repeat, the heart rates at launch for the 4 crewmembers were not monitored for this mission. This is Shuttle Control, Houston at 25 minutes, 20 seconds Mission Elapsed Time.

PAO This is Shuttle Control, Houston at 28 minutes Mission Elapsed Time. Flight Dynamics Officer, Ron Eppes, has updated the ohms 1 burn statistics based on the Dakar pass. The TIG was, time of ignition was 10 minutes, 30.8 seconds as previously reported. The delta V, 231 feet per second. The burn duration was a bit longer than previously reported. It was 2 minutes, 28 seconds...2 minutes, 28.3 seconds. Ohms 1 resulted in an apogee of 158 nautical miles and a perigee of 52.5 nautical miles. For ohms 2, Flight Dynamics Officer, Ron Eppes, reports the time of ignition at, predicted at 44 minutes, 46.6 seconds. The delta V should read 193.1 feet per second. The burn duration 1 minute, 59.6 seconds. Ohms 2 should result in an apogee of 160.4 nautical miles and a perigee of 158.3 nautical miles. We're at 29 minutes, 30 seconds Mission Elapsed Time. This is Shuttle Control, Houston.

PAO This is Shuttle Control, Houston at 33 minutes, 50 seconds Mission Elapsed Time. Less than a minute away now from possible contact with Columbia through Botswana. This is a very short pass of some 40 plus seconds. We will stand by and see if we have any kind of contact with the crew over Botswana.

CAPCOM Columbia, this is Houston with you through Botswana for about 1 minute.

PAO That was CAPCOM Bob Stewart making the call. We'll stand by.

PAO This is Shuttle Control, Houston. Thirty-six minutes Mission Elapsed Time. Apparently no contact with the crew through Botswana. The next station to acquire will be Yarragadee in approximately 15 and 1/2 minutes. Two events should occur in the next few hours for Brand, Overmyer, Lenior, and Allen to stay on orbit. The onboard computer system is reloaded from ops 1 to ops 2. This is needed to align the inertial platforms. Also 1 computer will be loaded with ops 3, the entry program and put to sleep, taken offline. Second, the payload bay doors must be open to provide cooling through the radiators to Columbia. The flash evaporator has a lifetime of several hours. We're at 36 minutes, 50 seconds Mission Elapsed Time. This is Shuttle Control, Houston.

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PAO This is Shuttle Control, Houston, 45 minutes
Mission Elapsed time. We're about 6 and 1/2 minutes away now
from reacquiring through Yarragadee; however, the ohms 2 burn
should be presently in progress. We'll stand by over Yarragadee
for a burn report and status. This is Shuttle Control, Houston.

END OF TAPE

PAO This is Shuttle Control, Houston. 45 minutes mission elapsed time. We're about 6 and one half minutes away now from reacquiring through Yarragadee. However, the OMS 2 burn should be presently in progress. We'll stand by over Yarragadee for a burn report and status. This is Shuttle Control, Houston.

PAO This is Shuttle Control, Houston. 47 minutes, 20 seconds mission elapsed time. We have a status report now on the solid rocket boosters. SRB 1 is at coordinates of 28.43 north, 78.01 west. SRB 2 at 28.43 north, and 78.02 west. Both are confirmed in a bouy mode. Both are floating. This is Shuttle Control, Houston. 47 minutes, 58 seconds mission elapsed time.

PAO This is Shuttle Control, Houston at 50 minutes mission elapsed time. The Payloads Flight Controller in Mission Control reports the data flow from the two commercial sattelites checks out. We're about a little over a minute away now from reacquiring Columbia through Yarragadee. We'll stand by. This is Shuttle Control, Houston.

PAO This is Shuttle Control, Houston at 51 minutes, 30 seconds mission elapsed time. Standing by for reacquisition of Columbia through Yarragadee.

CAPCOM Columbia, this is Houston with you through Yarragadee for 8 minutes.

SPACECRAFT Roger, Houston. Loud and clear. We had a good OMS 2 and we're major mode 106 pushing into the postinsertion check list. We have one anomaly, that's all. Give you in a minute.

CAPCOM Okay, we copy.

SPACECRAFT Okay, Bob. Kips may want to hear this. CRT 2 has apparently failed within the CRT of the DEU. It is flashing with only the upper one quarter of the screen lighted, and say in the lower one quarter of the screen is lighted, and it shows the stuff that would normally be up on the upper one quarter and it's flashing at about a 2 second rate. But we've power cycled it and brought it back on and we've tried to drive it with the BFS, no joy, it looks like it was a CRT problem.

CAPCOM Okay, we copy that Bob.

SPACECRAFT It's a little bit like your home TV having the picture slide down to the kind of lower left corner of the tube and then start flashing at a 1 CPS rate.

CAPCOM Okay, we copy your report. I've got an advisory for you before you get into OPS 2. As soon as you go to OPS 2 you'll probably get a cabin N2 message. That's its normal speed

of trap pressure so ignore it when it comes up.

PAO That was pilot Bob Overmyer reporting the CRT 2 problem.

SPACECRAFT And we had a good gimbal check and both OMS 1 and 2 were on time and nominal burns.

CAPCOM Okay, Vance. Copy to Burns and be advised we got reports of two SRB's floating out there. You guys lost them on the way up but we found them.

SPACECRAFT Good, glad to hear it. Hope the ship got out of the way.

CAPCOM Us, too.

PAO Shuttle Control, Houston. Commander Vance Brand reporting the second OMS burn was on time and as advertised.

PAO This is Shuttle Control, Houston. 56 minutes, 30 seconds mission elapsed time. A little over 3 minutes remaining on this very quiet pass over Yarragadee. We'll stand by and continue to monitor.

CAPCOM Columbia, this is Houston. We're 30 seconds to LOS at Yarragadee. Hawaii will be next at 1:18.

SPACECRAFT Okay, see you at 1:18. Everything's going good.

CAPCOM Glad to hear it.

PAO This is Shuttle Control, Houston. 1 hour of mission elapsed time. Loss of signal now with Columbia through Yarragadee. The next station to acquire will be Hawaii at approximately 17 and one half minutes. This is Shuttle Control, Houston.

END OF TAPE

PAO This is Shuttle Control Houston, 1 hour Mission Elapsed Time. Loss of Signal now with Columbia through Yarragadee. The next station to acquire will be Hawaii in approximately 17 and 1/2 minutes. This is Shuttle Control Houston.

PAO This is Shuttle Control Houston at 1 hour 16 minutes Mission Elapsed Time, little less than two minutes away now from reacquiring Columbia through Hawaii. Meanwhile as we come up over the stateside pass we should, the upcoming stateside pass we should get on with the payload bay door opening. Pilot Bob Overmyer will open the payload bay doors. The door opening sequence goes as follow, the centerline is unlatched, the starboard door is unlatched and opened 3 to 4 feet. The starboard door is then closed and latched along with the centerline latches. After this preliminary activity both doors are opened for an on-orbit operations. We're about 1 minute away now from Hawaii. This is Shuttle Control Houston.

PAO This is Shuttle Control Houston, 1 hour 18 minutes
CAPCOM Columbia, this is Houston with you through Hawaii, configure AOS (garble).

PAO That was CAPCOM Bob Stewart making a call.

CAPCOM And Columbia, when you get a chance we could use a Spec-1 on our GMC machine.

SPACECRAFT Houston, I read you (garble)?

CAPCOM Columbia, this is Houston, we just got your last transmission.

SPACECRAFT Okay Bob, how do you read ?

CAPCOM I've got you loud and clear. I saw that you were monitoring our requests for Spec-1 but we didn't get any downlink till the last call.

SPACECRAFT Okay, we'll give you Spec-1 on one of the tubes here.

CAPCOM Okay, we see Spec-1 on CRT 1.

SPACECRAFT Bob, are you reading CDR at all?

CAPCOM Negative.

SPACECRAFT Okay, I'll relay any problem. We're pressing right on down. And we're getting ready to open up payload bay doors here pretty quick, trying to get the television set up.

CAPCOM Okay Bob, we copy.

SPACECRAFT Houston, how do you read CDR now?

CAPCOM Columbia, this is Houston, would you-CDR give me a short count please.

SPACECRAFT Roger, 1,2,3,4,5 5,4,3,2,1.

CAPCOM Okay, Vance got you loud and clear on the count.

SPACECRAFT Roger.

CAPCOM And Columbia, this is Houston, now the configuration check for you. Our data down here shows that the supply water tank A press control valve on ML26C is not pressurized, could you check and make sure that the switch is pressurized?

SPACECRAFT Bob, please repeat that one.

SPACECRAFT Houston, Columbia, please repeat that one.

CAPCOM Okay, could you give us a SM Spec-1, and then we'll talk about the switch.

SPACECRAFT Okay, you have an SM on Spec-1.

CAPCOM Okay Vance, we got it. And the switch configuration was on ML26 Charlie, verify that the supply water tank A press control valve is depressurized.

SPACECRAFT (Garble).

END OF TAPE

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CAPCOM Verify that the supply water tank A press control valve is to pressurize.

SPACECRAFT (garble) Bob, this is Joe. How do read from the middeck?

CAPCOM Got you loud and clear Joe.

SPACECRAFT Okay, super. This is better than the sims. Call out the water supply switch you want thrown?

CAPCOM Okay, on ML 26 Charlie supply water tank A pressure control valve to pressure.

SPACECRAFT Okay, stand by.

PAO That was the first voice contact with mission specialist Joe Allen reporting from the mid deck. We're at 1 hour, 23 minutes mission elapsed time. About 2 and one half minutes remaining on this Hawaii pass.

SPACECRAFT Okay, Bob. That's done.

CAPCOM Okay, Joe.

CAPCOM Columbia, Houston. Have another switch configuration for you to check for me.

SPACECRAFT Go ahead.

CAPCOM Okay, on panel A 12, APU heater, gas generator/fuel pump heater. Three switches should be off. We show two of them still on.

SPACECRAFT Stand by.

PAO Shuttle Control, Houston. 1 hour, 24 minutes mission elapsed time. We show centerline latches 5 through 12 have been released on the payload bay doors - 5 through 12 were released. Now all of the centerline latches are released.

CAPCOM And Columbia, this is Houston. We'll be 30 seconds to LOS. We'll talk to you through Buckhorn in about 3 minutes.

SPACECRAFT Columbia, Roger.

PAO The starboard door has now been opened. We're at 1 hour, 25 minutes mission elapsed time. This is Shuttle Control, Houston at 1 hour, 25 minutes mission elapsed time. A loss of signal now through Hawaii. We will reacquire over the states in about 2 and one half minutes. This is Shuttle Control,

Houston.

PAO This is Shuttle Control, Houston. 1 hour, 26 minutes mission elapsed time. A little less than 2 minutes away now from reacquiring Columbia. Meanwhile the Flight Dynamics Officer reports the OMS 2 predicted numbers remained as advertised. Columbia presently with an apogee of 160.4 nautical miles - a perigee of 158.3 nautical miles. This is Shuttle Control, Houston.

PAO This is Shuttle Control, Houston. 1 hour, 28 minutes mission elapsed time. Standing by now for recontact with Columbia on the state side pass.

CAPCOM Columbia, this is Houston with you through Buckhorn on the state side pass.

SPACECRAFT Okay, Bob and the doors closed very nicely.

CAPCOM Okay, we copy that. And Columbia you can have your CRTs back now.

SPACECRAFT Okay Bob. And can you give me that (garble) switch on 11.

PAO This is Shuttle Control, Houston. Data shows the centerline latch is and the starboard doors are now closed again.

CAPCOM It's on panel A 12, APU heater, gas generator/fuel pump. Check all three of those switches off. We show 2 of them are still on.

SPACECRAFT Auto. They should go to off is that right?

CAPCOM That's a firm.

SPACECRAFT Okay. Say again Bob. I've got gas gen/fuel pump 1 and 2 going off, 2 going off, 3 off. Okay, I've got 2 of them off now.

CAPCOM Okay, good. If they're all three off that's where we want them. And we could use an SM spec 60 when you get time give you some PDI data.

SPACECRAFT Okay, I'd rather just get the doors open if that's okay with you Bob.

CAPCOM Okay, we copy.

PAO Shuttle Control, Houston. 1 hour, 30 minutes mission elapsed time. We'll stand by and continue to monitor the payload bay door opening on the state side pass. The present

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time the latches are closed and the doors are closed. They should be moving forward shortly to open the payload bay doors.

END OF TAPE

PAO Latches are closed and the doors are closed. They should be moving forward shortly to open the payload bay doors.

PAO Shuttle Control, Houston. 1 hour, 31 minutes mission elapsed time. The centerline latches are now being released. All of the centerline latches are now released. Pilot Bob Overmyer now proceeding with releasing the bulkhead latches. The starboard forward and aft bulkhead latches are now released. The starboard doors should be coming open.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Bob's got the starboard door just about all the way open. It's opening right on time. Payload looks beautiful.

CAPCOM Mighty fine.

SPACECRAFT We're just pressing through right on the other side. Forward and aft latches on the port door are opening at this time. Tell John I did this with a manual switch instead because I want to get some more views of those doors closing a little bit.

CAPCOM Okay, we copy that message.

PAO Starboard door is now opened.

SPACECRAFT We don't really have a good view of which roller is going to hit. Look like they're all going to hit right on the edge of the second plate. And the starboard doors-port doors coming open.

PAO The port bulkhead latches are unlatched and that was Pilot Bob Overmyer reporting the port door coming open.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT Okay, we have the PDI GFL/FPM loaded.

CAPCOM Okay, copy to PDI.

SPACECRAFT Doors are open.

CAPCOM How's the view?

PAO The payload bay doors are now opened. Both starboard and port doors are opened.

SPACECRAFT Bob, it looks real neat with the doors opened. And we have some articles of lint that came out of the payload bay but it was really pretty clean. Looks real neat.

CAPCOM Okay, we copy that and copy the good view but I'd still like to check it myself.

SPACECRAFT You'll get your chance Bob.

PAO Shuttle Control, Houston. 1 hour, 36 minutes mission elapsed time. Standing by now for television signal.

SPACECRAFT Okay Bob this is MS1/2. How do you read?

CAPCOM Got you loud and clear there 1/2.

SPACECRAFT Okay, I'm starting the post insertion (garble). Would you make sure the operator selects the (garble)?

CAPCOM We got it and we're watching the TV on it Jim or Bill.

SPACECRAFT Okay Bob. You say you got the TV on it.

CAPCOM That's affirmative. We're controlling the TV from down here.

PAO Shuttle Control, Houston. 1 hour, 40 minutes mission elapsed time.

SPACECRAFT Are you through with spec 1 by now.

CAPCOM Yes sir. We're through with spec 1.

PAO Earlier we...

SPACECRAFT Here comes the (garble) shield closed. Execute mark. Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Doing my (garble) got a little confused and grabbed a couple of the switches wrong on the fill and drain and the LO2 prevalve. And so you'll see some - I got it all sorted out - but you're going to see some cycles on the prevalve switches that really weren't intended.

CAPCOM Okay Bob. We copy that. Configuration looks good at this time.

SPACECRAFT Okay. And Bob, we might take a look around. We're getting a cabin amateur hybrid warning periodically. STS-5

SPACECRAFT And Bob, we might take a look around. We're getting a cabin amateur hybrid warning periodically. Something's up in the limit. We can't find it right now.

CAPCOM Okay. We'll look at through the data down here and see what's happening.

SPACECRAFT We are not getting a sulfur message but we're getting almost continuous cabin messages now.

CAPCOM Okay, I understand.

SPACECRAFT Okay, Bob. We got STA 2 for SRS available. We're on the top of page 3-5 beginning the health check. Flood lights have been off.

CAPCOM Okay, Bill. We copy. You'll be getting the health check.

SPACECRAFT CS is configured. Here comes internal power.

PAO That report. The health check is underway on the SBS. Now putting that on internal power.

SPACECRAFT Okay, Bob. I put that SBS on ASC 1 internal power and an MET of 1 hour, 43 minutes, 50 seconds.

CAPCOM Okay, Bill. We copy.

PAO That's mission specialist, Bill Lenoir making that report from Columbia.

CAPCOM And Bill, just for your information, the (garble) given the data and they say it looks real good to them.

SPACECRAFT Okay, super. Thank you much. And we will not read these numbers down to you unless you ask for them. It's interesting to note that the decoder right now has come up 255. I think it was 251 last time here at the Cape test.

CAPCOM Well, the word is that was due to the way the PDI was loaded. It's looking good.

SPACECRAFT That's what I figured. There was one four bit that was not set last time and obviously is now.

CAPCOM Columbia, this is Houston. 30 seconds to LOS. Dakar will be next at 1:53. And be advised that we see no problems with your PCS system right now. Possibly you're operating pretty close to the caution warning limit. When the cabin cools down a little bit you should get a little bit further away from that limit.

SPACECRAFT Okay, fine. Are we going to ... Maybe I missed it. We got a go for orbit OPS.

CAPCOM That's firm. You have a go for orbit OPS.

SPACECRAFT Okay. How long is the next LOS?

CAPCOM Next LOS is at 1:53.

SPACECRAFT For how long Delta t?

CAPCOM For 6 minutes.

PAO Shuttle Control, Houston. 1 hour, 48 minutes mission elapsed time. Loss of signal now with Columbia. Columbia will next be acquired in approximately 5 minutes through Dakar. This is Shuttle Control, Houston.

PAO This is Shuttle Control, Houston. 1 hour, 52 minutes mission elapsed time. Less than a minute away now from reacquiring Columbia through Dakar and Ascension. We'll stand by and pick up the conversation as it develops. Now receiving data through Dakar.

CAPCOM Columbia, this is Houston with you through Dakar and ascension for 10 minutes.

SPACECRAFT Okay, loud and clear. Okay, Bob. I held back on AMP (garble) configurative. I'm getting ready to send you the internal power.

CAPCOM Okay, copy you Bill.

SPACECRAFT Okay, there's internal power at 1:53 04 MET and I'll hold out for 4 minutes and you can locate it in realtime.

CAPCOM Roger.

SPACECRAFT Okay, Bob. And if you're getting down there, we got an APU hydraulic water boiler message at 1:51:42 and I've got spec 8886 up on CRT 3 at this time.

CAPCOM Okay, Bob. We've got the spec and we think it might be toggling of the transducer that caused us to call you about the unstable water boiler earlier. But we'll look at it.

SPACECRAFT Number 1 has got a rig press of minus 11 right now. The other 2 are okay.

CAPCOM Okay, we're going to attempt to gimbal another limit up to you so it won't keep bugging you through the flight.

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SPACECRAFT Okay, Bob. If you concur I'm just going to ignore that one and forget it. Is that it?

CAPCOM That's firm.

CAPCOM Columbia, this is Houston.

SPACECRAFT Yes.

CAPCOM We've got some reconfiguration for you. We would like to get some PDI data up to you and we'd like to also troubleshoot the CRT at the same time if you're ready to copy. We'd like you to deassign CRT 3 and assign CRT 2 to...

END OF TAPE

CAPCOM Columbia, this is Houston.

SPACECRAFT yes.

CAPCOM We've got some reconfiguration for you. We'd like to get some PDI data up to you and we'd like to also troubleshoot the CRT at the same time if you're ready to copy. We'd like you to deassign CRT 3 and assign CRT 2 to SM and give us a Spec 60 PRO on CRT 2 when you get that down.

SPACECRAFT Okay, say it again. We're on deassign CRT 3.

CAPCOM That's affirm, and then assign CRT 2 to you SM machine.

SPACECRAFT Okay Bob. I've got the same picture on SM on the machines. If you configure the-break the picture into quadrants, four quadrants, I have the upper quadrant, upper right quadrant, of the CRT SPEC antenna is displaced into the lower left quadrant of CRT 2. Now it just went blank, period.

CAPCOM Okay Bob, could you call a SPEC 60 on that machine please.

SPACECRAFT I'll try.

SPACECRAFT That's a blank tube right now, Bob. That's all we got.

CAPCOM Okay, we copy. Let us look at it for awhile. In the meantime, you've got a go for verniers and high loadvamp off and more on your boiler in a moment.

SPACECRAFT Okay, we'll do those things, Thank you.

SPACECRAFT Okay, Bob that's been on for 4 minutes, this is Bill back here on the SBS deploy, I'm going to secure that and close the doors.

CAPCOM Okay, we copy Bill.

SPACECRAFT Okay Bob, here comes the door closing.

CAPCOM Okay, Bob wish we could see it.

SPACECRAFT (garble) execute. Just off (garble)

PAO That report of door closing ...

SPACECRAFT (garble) doors are starting, you might notice that the (garble) might seem to hang for just a second. (garble).

PAO The door closing reported is the sunshield on the SBS. We're now processing data through Ascension.

SPACECRAFT Houston, Columbia.

CAPCOM This is Houston, go ahead.

SPACECRAFT Can I get CRT 3 back, I think 2 is dead.

CAPCOM Stand by a second.

SPACECRAFT Okay Bob, we got the sunshield closed, we got 2 out of 3 positions 1 and 2 indicating closed, 3 indicating blank, second signature was on (garble) except 1 second 3 also indicating closed.

CAPCOM Okay Bill, we copy that and see the Spacecraft is deconfigured.

SPACECRAFT Okay I understand, you've seen it all and you think it's neat too. We're going to set (garble).

CAPCOM Columbia, this is Houston, would you verify on panel L1 high load evap is off.

SPACECRAFT Okay, stand by.

CAPCOM And Columbia, this is Houston, we can't do much with your CRT 2, so we'd like you to deassign CRT 2 get 3 back up on line and give us a SM SPEC 60 please.

PAO That was CAPCOM Bob Stewart, who has reported earlier that their drawing a blank picture on CRT 2.

SPACECRAFT (garble) Okay, Bob what did you want on SPEC now please ?

CAPCOM We'd like SM SPEC 60.

SPACECRAFT You're getting it on 3.

CAPCOM Okay.

CAPCOM And Columbia Houston, we see some illegal entries there on CRT 3, might go over to CRT 1 and make sure you don't have any SPECS hung up underneath there.

SPACECRAFT Yes, we'll do it, and also, I'm worried that you had me to that SPEC 60 on the CRT 2, and then it died, I'm afraid it might have it on there.

CAPCOM Bob, we show that it does not have it.

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SPACECRAFT Okay, well let me try something else.

SPACECRAFT And all of section 3 in the deploy checklist is
completed, including the TVR VTR DEAC

CAPCOM Copy.

END OF TAPE

SPACECRAFT (garble)

SPACECRAFT (garble)

SPACECRAFT And all of section 3 in the deploy checklist is complete including the TVR, VTR deact.

CAPCOM Copy Bill.

SPACECRAFT Tell the guys they owe me one for giving it to them in realtime.

SPACECRAFT Okay Bob, I know where it was you got spec 60 upon the CRT 3.

CAPCOM Okay. We see it.

CAPCOM Columbia, Houston. We're about 20 seconds to LOS at Ascension. Botswana will be next at 207. Be about an 8 minute pass there.

SPACECRAFT Okay Bob. See you then.

PAO Shuttle Control, Houston. Two minutes, 4 seconds Mission Elapsed Time. A loss of signal now through Ascension. Botswana acquires in a little under 4 minutes. This is Shuttle Control, Houston.

PAO This is Shuttle Control, Houston. Two hours, 5 minutes Mission Elapsed Time. Flight Dynamics Officer, Ron Eppes, reports a parking orbit now of..with an apogee of 161 nautical miles, a perigee of 160 nautical miles. The orbital period is 1 hour, 30 minutes, 34 seconds. This report based on tracking data over the first..on the first stateside pass. At 2 hours, 6 minutes Mission Elapsed Time, this is Shuttle Control, Houston.

PAO This is Shuttle Control, Houston. Two hours, 7 minutes Mission Elapsed Time. Standing by for recontact with Columbia through Botswana. This is Shuttle Control, Houston.

CAPCOM Columbia, Houston's with you through Botswana for 8 minutes.

SPACECRAFT Okay. Loud and clear.

SPACECRAFT Tough to keep away from the windows Bob.

SPACECRAFT These restraints are no sweat. You just take off your boots and your socks and you can use your toes. It's like having four hands.

CAPCOM I wouldn't touch that one with a 10 foot pole Bill.

SPACECRAFT Or a 9 foot Greek, huh?

SPACECRAFT He's really...he means it. He's barefoot.

SPACECRAFT I presume you got that stuff in.

CAPCOM We didn't quite get all the PDI data up to you there because of the time constraint but you can have the CRT back now. We'll have to get it back again at Hawaii.

SPACECRAFT Okay. I understand you have the rest mats set up so we can proceed with the rest data update.

CAPCOM That's affirm. The rest mats are onboard.

SPACECRAFT Thank you.

SPACECRAFT Bob is INCOM able to see the fuel cell purge. You want on?

CAPCOM We've got a UHF sight here. We won't be able to see it until we get over to Hawaii.

SPACECRAFT (garble) at Botswana.

SPACECRAFT Okay. We're in the fuel cell purge at the top of page 1-15.

CAPCOM Okay.

PAO Shuttle Control, Houston. Two hours, 10 minutes. That was Pilot Bob Overmyer reporting they're presently purging the fuel cells.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead Bob.

CAPCOM Okay. When you get to the block where you configure the controls for on-orbit on panel L1, we'd like to leave the FESS primary A on for about another orbit and we'll give you a call when to turn it off.

SPACECRAFT Okay. Copy. We'll leave FESS PRI A on for another orbit.

CAPCOM That's (garble), Vance.

SPACECRAFT We'll await your call.

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CAPCOM Columbia, Houston. We're 30 seconds to LOS, Yarragadee is next 02:27.

SPACECRAFT Okay, see you there.

PAO Shuttle Control Houston, 2 hours 16 minutes, Mission Elapsed Time. Loss of Signal now through Botswana, Columbia will next be acquired through Yarragadee, this also a UHF only station. We'll receive no telemetry data until Hawaii. At 2 hours 16 minutes, Mission Elapsed Time, this is Shuttle Control Houston.

END OF TAPE

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PAO At 2 hours 16 minutes Mission Elapsed Time this is Shuttle Control Houston.

CAPCOM Goddard, Houston, air-to-ground 1.

CAPCOM Goddard, Houston, air-to-ground 1.

GODDARD This is Goddard voice on air-to-ground 1.

CAPCOM This is Houston, how do you copy?

GODDARD George, you're a little weak.

CAPCOM Ah, test 1,2,3, 3,2,1 how do you copy?

GODDARD Stand by, let me go get you in another position.

GODDARD Houston, Goddard, voice check.

CAPCOM Yes, Houston, test 1,2,3, 3,2,1 how do you copy?

GODDARD You're loud and clear.

GODDARD Okay you're loud and clear Ed, thank you.

GODDARD Thank you.

White House Goddard.

White House Goddard.

PAO This is Shuttle Control Houston, at 2 hours 27 minutes Mission Elapsed Time. Less than 30 seconds away now from Yarragadee acquisition, this is Shuttle Control Houston.

CAPCOM Columbia, this is Houston with you through Yarragadee for 7 and 1/2 minutes.

SPACECRAFT Okay Houston, loud and clear, we're busy configuring the cabin here.

CAPCOM Okay Vance, and have you had a chance to put your debris report on the recorder yet?

SPACECRAFT Not yet.

CAPCOM Okay.

SPACECRAFT But, we'll do that first opportunity.

CAPCOM All right, sir, and have you got anybody back around R13?

SPACECRAFT Bob, how do you copy Joe?

CAPCOM You're loud and clear Joe.

SPACECRAFT Okay, while Vance and Bob are working there, I can give you a short report. Looking out through the side window, right at SRB sep it looked like it began to snow, and it stayed with us, snow going in all directions, not just streaming back along the vehicle, all very small, very white particles, and that went till you called one engine TAL capability.

CAPCOM Okay Joe, we copy that.

SPACECRAFT And nothing large, the impression is, it looked very much like ice, it certainly didn't seem to be off the, any material of any color. And we've looked around the outside of the vehicle from our windows and as near as we can tell, everything looks normal.

CAPCOM Okay, mighty fine. Okay Columbia, and if you've got somebody back around R13, I'd like you to get somebody to give me a check on the caution and warning parameters matrix, lights that are illuminated in column 4.

SPACECRAFT Stand by.

SPACECRAFT Okay Bob, doing what we're showing tripped is 04.

CAPCOM Okay, copy 004 is illuminated. And could you look up on S7, and tell me if the cabin atmosphere light is still on?

SPACECRAFT That's affirmative Bob.

CAPCOM Okay, thanks a lot, we're still chasing down your cabin pressure problem here.

SPACECRAFT Okay, what does our cabin press look to you? It looks pretty good to us.

CAPCOM Yes, the cabin press looks fine, we're just trying to find out why you got the warning, and we just can't quite put our finger on it yet.

SPACECRAFT I'm glad you got something to do.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Rob, we checked the star tracker and we had star pass on both Y and Z trackers, and just opened the doors successfully, door open time was about 7 seconds, both.

CAPCOM Okay Vance, we copy.

SPACECRAFT Okay Bob, and per the pictorial of page 1 Alpha -3, I'm taking those O2 and H2 tank heaters for 3 to auto at this time.

CAPCOM Okay, we copy.

CAPCOM And Columbia, this is an advisory on your cabin press. We do think that it was the problem we talked about before. That was, your just toggling back and forth across the caution warning limit and it'll come back down with time.

SPACECRAFT Okay fine, that was sort of our impression too, thanks.

CAPCOM Columbia, Houston, we're 30 seconds to LOS at Yarraquadee. Guam will be next at 02 42.

SPACECRAFT Okay.

END OF TAPE

SPACECRAFT Okay fine, that was sort of our impression too.
Thanks.

CAPCOM Columbia, Houston. We're 30 seconds to LOS at
Yarragadee. Guam will be next at 02:42.

SPACECRAFT Okay, understand. Hey Bob, we clear to switch APU
cooling systems?

CAPCOM Stand by Bob.

CAPCOM Columbia, Houston. You're go to switch APU
cooling systems in the blind.

SPACECRAFT Thank you.

PAO Shuttle Control, Houston. 2 hours, 35 minutes
mission elapsed time. Loss of signal now through Yarragadee.
Next to acquire will be Guam in a little under or about 6 and one
half minutes. This is about a 3 minute pass through Guam.

The White House Houston contact.

This is White House, Houston, go ahead.

You've got COM check. How do you copy?

Loud and clear.

Okay, you're loud and clear also.

PAO Shuttle Control, Houston at 2 hours, 42 minutes
mission elapsed time. Now processing data through Guam.

CAPCOM Columbia, this is Houston with you through Guam
for 3 minutes.

SPACECRAFT Okay, Houston. Loud and clear.

CAPCOM And Columbia be advised. You're pretty close to
getting a warning on the water tank, B quantity, because we're
still on the FES. No problem.

SPACECRAFT Okay, thanks for the advisory.

CAPCOM Columbia, this is Houston. Would you give us a
resume on spec 60 please.

SPACECRAFT Okay, Bob. Do you want resume on CRT 3. Is that
a firm?

CAPCOM That's a firm.

SPACECRAFT Okay, Bob. There's a resume on CRT 3.

CAPCOM Okay, we see that. And Bill, just as a status report for you due to your expeditious completion of a health check your spacecraft retained a couple of more degrees of temperature so everything is looking good.

SPACECRAFT Good, glad to hear that and understand if there's anything funny come up you'll - we thought that they'd say - you'll let us know.

CAPCOM That's firm.

PAO That was CAPCOM. Bob Stewart advising Bill Lenoir that the SBS satellite data looks good.

CAPCOM Columbia, Houston, we're 20 seconds to LOS. Hawaii will be next at 0:2:53.

SPACECRAFT Okay, we read you Bob.

PAO This is Shuttle Control, Houston. 2 hours, 45 minutes mission elapsed time. Loss of signal now with Guam on the end of this second revolution.. Next station to acquire will be Hawaii in about 7 and one half minutes. 2 hours, 46 minutes mission elapsed time, this is Shuttle Control, Houston.

PAO Shuttle Control, Houston at 2 hours, 53 minutes mission elapsed time. We're now processing data through Hawaii.

CAPCOM Columbia, this is Houston with you through Hawaii for 8 minutes.

SPACECRAFT Hello, got you Bob. And Bob, this is Joe. I can do an ERG calibration on left front for Kennedy equipment down if somebody's got ship charts there.

CAPCOM Okay, Joe. We're ready, go ahead.

END OF TAPE

CAPCOM Columbia, this is Houston with you through Hawaii for 8 minutes.

SPACECRAFT Hello. Got you Bob. Rob, this is Joe. I can do an EOG calibration (garble) for Kennedy equipment down if somebody's got ship charts there.

CAPCOM Okay, Joe. We're ready. Go ahead.

SPACECRAFT Okay. I'm doing a calibration now. Stand by. Bob, that was a lot of fun. We'd like to reset and do it again.

CAPCOM Columbia, Houston. We'd like you to give us an SM spec 60 please.

SPACECRAFT Okay, it's on CRT 3.

CAPCOM Okay, copy. We see it on CRT 3. And, have you guys had a chance to get your debris reports yet. We'd like to go back to normal recorder management if you have.

SPACECRAFT We'll get them. (garble) I'm going to call you right now. By the way Bob, through the PLT side my window is so dirty I saw a couple of specs go by and then I was watching the engines so I don't have any report and Vance is going to do it right now.

CAPCOM Okay. You all just give us a hollar when you get through. In the meantime, we got a couple of configurations for you. On panel L1, the high load duct heater rotary switch, we'd like that to go to off please.

SPACECRAFT Okay, high load duct heater off.

CAPCOM And you have a go for item 48, airlog reset whenever you want to do that.

SPACECRAFT Okay, we'll do it to a pass at SM here.

SPACECRAFT Bob, I've finished the EOG calibration and I was on setting 2 and setting 3 and you should have gotten both EOG traces and a potentiometer trace. I hope that your back room can report you did.

CAPCOM Okay Joe. We copy and we'll let you know and we'd like to get that SM spec 60 back up please.

SPACECRAFT Okay, I'm going to take down the medical equipment now.

CAPCOM Joe, you'll be pleased to know that all the traces came down (garble).

SPACECRAFT Okay, very good and a subjective comment. I really feel no different now than just before launch.

CAPCOM Outstanding.

SPACECRAFT But as we suspected, these MSCs are a lot easier to handle in zero g.

CAPCOM Columbia, this is Houston. Whenever you have a chance I've got some fuel cell delta volts for you to copy. If you'd like them now I'll give them to you.

SPACECRAFT Okay Bob, I'm on the way up now.

SPACECRAFT Okay Bob, I've got my cue card ready to copy.

CAPCOM Okay. They are 1 decimal 1, 1 decimal 0, 1 decimal 0.

CAPCOM Columbia, we are 30 seconds to LOS and be advised the water spray boiler quantity for water spray boiler one TM BU is on board. We set it low so you shouldn't be bothered a caution and warning anymore.

SPACECRAFT Okay, Bob. (garble)

CAPCOM And we'll talk to you through Buckhorn at 3:03.

SPACECRAFT Okay, see you at 03.

PAO Shuttle Control, Houston. 3 hours, 1 minutes mission elapsed time. Loss of signal through Hawaii. Columbia will be reacquired through Buckhorn in less than, about a minute and a half. Columbia now coming up on the start of the third revolution.

CAPCOM Columbia, this is Houston with you through Buckhorn for 8 minutes.

SPACECRAFT Got you Bob. We copy and we're with you. And Bob, I just made the debris report and it was started somewhere around 3 hours and I cycled CRT 1 power.

CAPCOM Okay, Vance. We see the CRT cycles. And Columbia we still need the spec 60 for a little bit longer if you can make sure we got one here.

SPACECRAFT Got it. And we're going to the Cap and putting aside our insertion book.

CAPCOM That sounds good.

CAPCOM (Garble). And Columbia, we still need the spec 60 for a little bit longer if you can make sure we got one in.

SPACECRAFT Got it. We're going to the Cap, putting aside our insertion book.

CAPCOM That sounds good.

PAO Shuttle Control, Houston. 3 hours, 5 minutes.

SPACECRAFT (garble) all that RMS stuff in the post position.

CAPCOM Copy, and we concur with that.

SPACECRAFT We looked to see if we had one when we got on orbit and it didn't look like we did.

CAPCOM That might explain some low performance if you had one there.

SPACECRAFT Right. Any comments on that performance.

CAPCOM No, Vance. Not at this point. Just haven't analyzed it yet.

SPACECRAFT Okay.

PAO The report from Columbia...

SPACECRAFT (garble) seem to get us into orbit with delta V to spare.

PAO The report from...

CAPCOM Wasn't that long.

PAO ...from Columbia. The crew aboard Columbia now working with a crew activity plan. The reference to the RMS was a joking reference since the documentation remained in the...

CAPCOM Colonel Vance, you know that low performance call was just for a stuck throttle. Eventualities, your real performance going up there was good.

SPACECRAFT Oh, it was a fine ride I'll tell you.

PAO The reference to the RMS was remained in the post deorbit prep document. The crew should shortly be aligning the IMU. With 3 hours, 7 minutes mission elapsed time this is Shuttle Control, Houston continuing to monitor the state side pass.

CAPCOM Columbia, this is Houston. We'd like to report that the post insertion activities by the ground are now done and you can have spec 60 back.

SPACECRAFT Super. Thank you, sir.

CAPCOM Columbia, this is Houston. In about 1 minute we're going to lose you for 2 minutes and pick you up at Milam. In the meanwhile, if someone's available, I would like you to put the right ADI switch into LVLH. It will help us look at some angles down here on the ground.

SPACECRAFT Okay, Bob. Say where you wanted those switches inertial or LVLH.

CAPCOM Okay, yes that's the right ADI switch to LVLH.

SPACECRAFT Got it, Bob.

CAPCOM And Columbia, we'll be LOS in 10 seconds. See you in 2 minutes.

SPACECRAFT Okay.

CAPCOM Columbia, Houston is with you through Milam. Standing by.

SPACECRAFT Okay, and we're in the maneuver to IMU, Y align attitude.

CAPCOM Vance, be advised that during the next Ascension pass, at about 9:55, we're going to have a quest CAPCOM talk to you for a few minutes.

SPACECRAFT Okay, great. We'll be standing by. That's at, say that time again.

CAPCOM That was, excuse me I gave you an eastern standard time. That will be during the Ascension pass at, what about 3, standby 3:35 or 3:36. I'll give you some warning closer to the time.

SPACECRAFT Okay, good. Bob, for your debris report, there are chunks of material coming off the OMS pod off the back. They look like pieces of paper. They're quite thin and they're about the size of a flake of paper up to and including an 8 and one half by 11 sheet of paper. Very thin.

CAPCOM Okay, we copy that Joe, and you say you can definitely tell it's coming off of the pod surface.

SPACECRAFT Very thin.

CAPCOM Okay, we copy that (garbled) and you say you can definitely tell it's coming off of the pod surface?

SPACECRAFT Appearing from behind the pod. That's correct.

CAPCOM Okay, copy. From behind the pod.

PAO Shuttle Control Houston, 3 hours 19 minutes Mission Elapsed Time. The GNC reports Columbia in the proper alignment attitude for the IMU alignments and the stars are in. Things look good. We have about a minute remaining on this pass through Bermuda. We'll stand by and continue to monitor.

CAPCOM Columbia, this is Houston. We're 30 seconds to LOS. Ascension is next at 03:33. We see the stars and the star trackers. We have the torquing data. All we'll need from you on the alignment is the torquing time.

SPACECRAFT Okay.

PAO Shuttle Control Houston, 3 hours 20 minutes Mission Elapsed Time. Loss of Signal now with Bermuda. Columbia will be reacquired at Ascension in approximately 12 minutes. This is Shuttle Control Houston.

PAO This is Shuttle Control Houston. 3 hours 32 minutes Mission Elapsed Time. Standing by now for reacquisition of signal with Columbia through Ascension. We're now processing data through Ascension.

CAPCOM Columbia, this is Houston with you through Ascension for 6 minutes.

SPACECRAFT Okay, this is Columbia, Loud and clear.

CAPCOM Okay Vance, We've got a little problem here with the OPS 1 recorder getting a bit hot and in order to get that guy cooled down a little bit we'd like you to take both Freon Loops to interchange your flow please.

SPACECRAFT Okay, that's being done. And that's on interchangeable.

CAPCOM Okay, sir, thank you and Vance we're standing by for a talk in time on your aligns if you have that.

SPACECRAFT Roger, if you don't know the numbers, we torqued at 3 hours 22 minutes 48 seconds.

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CAPCOM Okay copy, 3:22:48.

SPACECRAFT And Houston, Columbia, the aft controller checkout's completed, checked out good.

CAPCOM Okay copy, Vance.

SPACECRAFT (garble) your way behind on it. You were supposed to start it at 3:10 and it's 3:36.

CAPCOM White House, stand by for the President.

Yes sir, I'm standing by

CAPCOM Columbia, this is Houston, stand by for message from the President of the United States, go ahead Mr. President.

One moment.

Columbia, this is the White House, we're waiting for the President to pick up.

SPACECRAFT Roger.

President Reagan Hello?

Columbia, this is the White House, we have the President of the United States, go ahead.

President Reagan Hello?

SPACECRAFT Hello Mr. President?

President Reagan Yes?

SPACECRAFT This is Columbia?

President Reagan Yes, who is this?

SPACECRAFT Vance, Yes sir, all four of us are standing by here and having a good time up here sir, getting ready for a deployment.

President Now wait until I get my hat and I'll go with you. Listen, I just wanted to tell you Vance Brand, Robert Overmyer, William Lenoir and Joseph Allen, how proud we all are of what your doing, and how much our prayers are with you, for success and how everyone down here is watching and how pleased we were with the beautiful send off this morning. You know some time ago I had an opportunity to speak to some astronauts who were up there on one of the earlier flights of Columbia, and I asked them if when they came over Washington on there last go

President Reagan With you for success, and how everyone down here is watching and how pleased we were with the beautiful send off this morning. You know, sometime ago, I had an opportunity to speak to some astronauts who were up there, on one of the earlier flights of Columbia, and I asked them if when they came over Washington on there last go around, they'd pick me up and drop me off in California with them, and I'll repeat the request, they didn't do it. But seriously, we are very proud of you, and you know how much all of us here down below are rooting for you up there. All of America is watching you.

SPACECRAFT Well thank you very much sir, it's a beautiful world that we're going over. We are currently over the Atlantic and we're very proud to be up here representing America.

President Reagan Well, we're proud of you. And, we're going to try down here to keep that world as beautiful as it is, to you looking at it from up there. Sometimes, I wonder just seeing some the results of your flights, the pictures and all, I wonder if more of us could see it from that angle we might realize that there must be a way to make it as united in reality here on Earth as it looks from outer space, over.

SPACECRAFT Yes sir, we're in total agreement on that one.

President Reagan Alright, well God Bless you and best wishes to all of you. Again, congratulations, over.

SPACECRAFT Okay,

President Reagan Over and out...

CAPCOM 5 seconds to LOS Columbia.

SPACECRAFT Okay.

PAO Shuttle Control Houston, Loss of Signal now with Columbia through Ascension. We're at 3 hours 40 minutes Mission Elapsed Time. During the Ascension pass, the crew aboard Columbia spoke with the President of the United States. At 3 hours and 40 minutes, Mission Elapsed Time, this is Shuttle Control Houston.

CAPCOM Columbia, this is Houston with you through Botswana for 7 minutes.

SPACECRAFT Okay, loud and clear.

SPACECRAFT Looks a little bit like a studio up here right now, Joe is setting up all these cameras.

CAPCOM Well that's great, he's a man after my own heart.

CAPCOM Columbia, this is Houston, we're 15 seconds to LOS, we'll talk to you next at Yarragadee.

SPACECRAFT Okay Bob, we copy that.

CAPCOM Roger Bob, and I stand corrected, the next pass will be Guam.

(garble) air to ground one, coming from Bermuda.

PAO This is Mission Control Houston. Less than a minute now from acquisition of spacecraft Columbia through the station at Guam. As the crew completes those unstowing cabin equipment, and coming up on there noon meal. Acquisition expected at any moment, and standing by.

SPACECRAFT (garble)

CAPCOM Columbia, this is Houston, with you through Guam for 8 minutes.

SPACECRAFT Roger Bob, we copy.

SPACECRAFT Roger Houston, we copy, how do you copy us ?

CAPCOM Bob, got you loud and clear, and at your convenience, we'd like to get those star trackers into the track mode.

SPACECRAFT Okay, we'll do it.

CAPCOM Columbia, this is Houston, we'd like to get a SM SPEC 62 and Item 6 please.

SPACECRAFT SPEC 62 and Item 6. It was 6 wasn't it Bob?

CAPCOM That's affirm, Item 6.

SPACECRAFT Okay, you got it.

CAPCOM Columbia, this is Houston, we've got 50 minutes, 50 seconds to LOS, Hawaii will be next at 04 29, this is probably the last pass for the ascent guys, we sure enjoyed working with you, you guys sure make it easy flying those good ascents like that.

SPACECRAFT Thanks for giving us such a good one.

END OF TAPE

CAPCOM Columbia, this is Houston, we've got 50 minutes, 50 seconds to LOS, Hawaii will be next at 0429, this is probably the last pass for the ascent guys, we sure enjoyed working with you, you guys sure make it easy flying those good ascents like that.

SPACECRAFT Thanks for giving us such a good one. It was good working with you Bob, we'll see you later.

CAPCOM Okay Vance, 20 seconds to LOS, private medical conference when you first hit Hawaii on the next pass.

SPACECRAFT Okay, we'll be standing by for that.

PAO This is Mission Control Houston, Loss of Signal at Guam. 5 minutes away from reacquisition through Hawaii at which the crew will have a private medical conference with the orbit team flight surgeon, Dr. Ellen Schullman. Meanwhile, the orbit team is settling down for the days activities headed up by flight director Dr. John Cox. We're 3 hours 34 minutes away from deploying the first of the two commercial satellites (SBS). Here likely will be part of the Hawaii pass turn back to the CAPCOM after the private medical conference, and we'll return at that time.

CAPCOM Columbia, Houston, the orbit team is with you for another 5 minutes through Hawaii. We'd like to congratulate you on a beautiful launch today, and we're looking forward to an equally successful deploy.

SPACECRAFT Okay, well thank you much. We're gonna be trying hard, we'll get a good one.

CAPCOM Roger that Vance.

CAPCOM And Columbia, Houston, we're 30 seconds from LOS, we'll talk to you through the states in about 3 minutes.

SPACECRAFT Okay, see you there.

PAO This is Mission Control Houston. The private medical conference only took less than 2 minutes of the Hawaii pass before it was handed back to the CAPCOM on the orbit team, Mike Coats. We're about a minute away from reacquisition through the states. The off going ascent team flight director Tommy Holloway and his data processing system engineer Ernie Smith will conduct a change of shift press conference at approximately 11:20 CST in the briefing room of the JSC Newscenter. Should have acquisition within about 30 seconds through Buckhorn and Goldstone.

CAPCOM Columbia, Houston with you through the states for 7 minutes, over.

SPACECRAFT Got you loud and clear.

CAPCOM Roger, and he advised the payload comm system is working perfectly, and you're also go for APU cool off.

SPACECRAFT Super on the payload comm, okay understand, we'll do the APU thing.

CAPCOM Roger.

SPACECRAFT And Mike, that's APU cooling off, right?

CAPCOM That's affirmative.

SPACECRAFT Mike, are you down there?

CAPCOM That's affirmative, Bob.

SPACECRAFT Got a bunch of tourists there, everybody's up against the windows. There's a photo pass, You ought to see this Mike, even as we speak, we're looking at the entire Peninsula of Baha California, the Gulf of California, we can easily see the Salton Sea, the Mojave, the whole 9 yards here, we're just coming right up on it going down the edge of Mexico and then we're gonna hit right across Central America.

SPACECRAFT Looks like L.A. is absolutely clear this morning. The channel Islands are clear.

CAPCOM Roger, sounds like a beautiful sight.

SPACECRAFT And Mike, while we got you, what parameter was giving us that caution warning on that cabin atmosphere all the time?

CAPCOM Roger, stand by.

SPACECRAFT It's strictly a hardware, but we were curious.

CAPCOM And Columbia, Houston, that's cabin pressure, and we're just toggling right on the edge of the limit, that's no problem.

SPACECRAFT Okay.

CAPCOM It's the upper limit on the cabin pressure, we're about 20 seconds from LOS

END OF TAPE

(garble)

CAPCOM And Columbia, Houston. That's cabin pressure and we're just toggling right on the edge of the limit. That's no problem.

SPACECRAFT Okay.

CAPCOM That's the upper limit on the cabin pressure. We're about 20 seconds from LOS. We'll talk to you again through Mila at 4 plus 51.

SPACECRAFT Okay. 4 plus 51

CAPCOM Columbia, Houston with you through Mila for 2 minutes. Over.

SPACECRAFT (garble)

CAPCOM And Columbia, Houston, you're go to turn the APU controller power, 3 of them to off.

SPACECRAFT Okay Mike. We've got them off.

CAPCOM Roger.

CAPCOM And Columbia, Houston, we're 30 seconds to LOS. We'll talk to you through Ascension in 5 plus 09.

SPACECRAFT Okay see you at Ascension.

PAO This is Mission Control, Houston. Loss of signal through the Merritt Island launch area tracking station on orbit 4, Columbia's 5th flight into space. Sixteen minutes from reacquisition through Ascension Island. Meanwhile, the change of shift press conference with Flight Director - Ascent Team Flight Director Tommy Holloway and his data processing officer, Erni Smith, should start at about 11:20 in the JSC News Room. Back in 15 minutes at Ascension. Mission Control, Houston.

CAPCOM (garble)

CAPCOM Columbia, Houston with you through Ascension for 3 minutes. We hope you're enjoying your meal.

SPACECRAFT Yes. We're really chowing down here. Just finished the (garble) pass over South American too.

CAPCOM Roger.

CAPCOM And Columbia, Houston, we're 30 seconds to LOS. We'll talk to you through Botswana at 5 plus 19.

SPACECRAFT Okay. See you over Africa.

CAPCOM Columbia, Houston standing by through Botswana for 7 minutes.

SPACECRAFT Roger Houston. Loud and clear. We're chowing down.

CAPCOM Roger. We copy.

CAPCOM And Columbia, Houston. We're 30 seconds from LOS. We'll talk to you through Guam at 5 plus 51 and we'll have the pads ready for you then and a weather message will be coming up over Guam.

PAO This is Mission Control, Houston. Acquisition now through Guam Island. At this pass, the CAPCOM will read up the so called pads, the information for deploying the SBS satellite and for the separation maneuver, some 14 minutes after deploy.

CAPCOM Columbia, Houston with you in Guam for 7 minutes. Over.

SPACECRAFT Okay. We're reading you loud and clear.

CAPCOM Okay. We've got you loud and clear. We'd like to get...we'd like you to clear the star table if you could, item 20 on spec 22. You can expect a teleprinter weather message coming up at this pass and we've got the deploy and set pads when you're ready to copy.

SPACECRAFT Okay Mike. Standby.

CAPCOM Roger.

SPACECRAFT Okay. Go ahead with the pads.

CAPCOM Roger. Columbia, Houston the SBS deploy pad follows: Deploy time, MET 0 days/07:58:35. GMT 315/20:17:35. Item 17 GMT plus 27289055. Deploy attitude: 024.15, 087.28, 292.55. Read back.

SPACECRAFT Okay Mike. Read back follows: Deploy time MET 7 hours, 58:35. 315/20:17:35. Seconds 27289055. Attitude roll: 024.1...

END OF TAPE

SPACECRAFT Okay Mike. Read back follows. Deploy time MET 7 hours, 58:35. 315/20:17:35. Seconds, 27289055. Attitude roll, 02415, 08728, 29255. Over.

CAPCOM Roger Bill. That's a good read back and I've got the set burn pad when you're ready to copy.

SPACECRAFT Go ahead.

CAPCOM Roger. SBS set burn pad follows. Ops ohms engines, TV roll 180, trim load -0.2, -5.7, plus 5.7, weight 223689. TIG 0 days/08:13:35.0. TIG 7 targets: plus 0015.4 plus all balls minus 004.4. Burn attitude, 024, 035, 345. Delta V total: 0016.0. TIGO, 00:09.

SPACECRAFT (garble) after the item 26 so I can give a total (garble).

CAPCOM Okay. Delta V total: 0016.0. TIGO is 00:09. VIGOX plus 0015.40. Plus all balls. Plus 004.41. Target HA is 169 and HP is plus 161. Read back.

SPACECRAFT Okay Mike. I'll read it back. Ohms (garble) TV roll 180 minus 0.2, minus 5.7 plus 5.7. 223689, 0081335.0 plus 0015.4. All balls minus 004.4. Burn att. 024, 035, 345. 16.0, Niner seconds minus 15.40 all balls and plus 4.41. 169, 161. Over.

CAPCOM Roger. The VIGOX Bob, should be plus 0015.4.

SPACECRAFT 15.4 plus.

CAPCOM And that's a plus sign on that.

SPACECRAFT Okay. Plus.

CAPCOM Okay. That's a good readback, Bob.

CAPCOM And Columbia, Houston, the target's, the TIMBU's and excell biases are all onboard now.

SPACECRAFT Okay. Thanks.

CAPCOM And the targets are looking good.

SPACECRAFT I wonder if you can do something to help us do a lot of searching up here. We got the long water hose for the dispenser and we thought it was supposed to have a faucet on that and, where's the faucet or the fixture on the end of it or are we finding the wrong hose?

CAPCOM Okay. Understand you're missing the dispenser on the end of...the faucet on the end of the water dispenser.

SPACECRAFT I thought that maybe there somewhere somebody just tell us where to start looking for it. We're not sure.

CAPCOM Okay. We're working on it.

CAPCOM Columbia, Houston we've got about a minute left in this Guam pass. We notice you've got a S76 comm fault message. Do you know what caused that?

SPACECRAFT (garble). Mike, this is Joe. We were experimenting with the VTR and the monitors here and the message came up during that time. We have had no power on the camera since we opened the payload bay doors, so we think that it may be some kind of a false message. It's since gone away and the camera (garble) message.

CAPCOM Okay Joe. We copy that and that's understood now and expected.

SPACECRAFT We're just puzzled why a camera (garble) came up because they were turned off.

CAPCOM And Columbia, Houston, we have about 8 seconds left in the pass. We'll talk to you through Hawaii at 6 plus 05.

SPACECRAFT Roger. We'll see you then.

PAO This is Mission Control, Houston. Elapsed time of 6 hours into the 5th flight of orbiter Columbia.

END OF TAPE

PAO This is Mission Control Houston, Elapsed time of 6 hours, into the 5th flight of orbiter Columbia. Loss of Signal through Guam. About 4 and 1/2 minutes roughly away from reacquisition through Hawaii. Spacecraft communicator Mike Coats read up to the crew of Columbia the numbers they will need for the payload deploy the SBS, and also for the separation burn that happens some 15 minutes later. Deploy time is now, a elapsed time of 7 hours 58 minutes 35 seconds. The separation burn will be 2 OMS engine burn, both engines of 16 ft per second posigrade, which will be 15 minutes later, 15 minutes after deploying the SBS. Back in about 3 minutes at Hawaii, Mission Control Houston.

PAO This is Mission Control Houston, 50 seconds now away from reacquisition of Columbia through Hawaii. Slightly over one orbit away now from deployment of the SBS satellite on the next orbit, orbit number 6, as Columbia sweeps down across the Eastern Pacific. Crew will move to their deployment checklist, as they begin this rev.

CAPCOM Columbia, Houston, with you through Hawaii for 7 and 1/2 minutes, over.

SPACECRAFT Okay, loud and clear.

CAPCOM And Columbia, Houston, the contingency water dispenser can be found in the IFM locker MF43K.

SPACECRAFT Okay, yeah, we were looking there Mike, but we can't find the, there should be an end on the thing right?

SPACECRAFT Should be an end on the thing, we got all kinds of contingency water, or not contingency water dispenser. What I'm looking for is the water dispenser that attaches the hose that attaches the operational water dispenser, Mike.

CAPCOM Okay, we're looking at that....

CAPCOM And Columbia, Houston, we'd like to verify that you tried location ML84K to get the water hose and dispenser next to window shade back.

SPACECRAFT Okay, that's where we didn't look, we were looking in the wrong place. ML24K,

CAPCOM Roger, ML84K.

SPACECRAFT 84, ML84K.

CAPCOM That's correct, and as far as that SPEC 76 COMM message, anytime that the VTR's in playback, the video control

unit treats it as a camera and this sense a temperature that's not there. Which means any kind of noise in the system causes that message.

SPACECRAFT Okay, Mike that's exactly what happened. That explains it, thank you.

CAPCOM Roger Joe.

CAPCOM And Columbia, Houston, we're 45 seconds to LOS, we'll talk to you again through the States at 6 plus 16, we'd like to request that you go ahead and take the APU heater gas generator fuel pump to A auto on panel A12, the callout at the top of page 4-6 on the CAP.

SPACECRAFT Okay, copy. And Houston, still copy.

CAPCOM Roger, we copy.

SPACECRAFT Do you want PRI A turned off? We still have it, we have the topping on now.

CAPCOM Stand by a second Vance. Roger, we'd like to leave that on for a while, Van.

SPACECRAFT Okay.

CAPCOM Columbia, Houston with you through Buckhorn for 2 minutes, over.

SPACECRAFT ...go ahead.

CAPCOM Roger, read you loud and clear. We're standing by through Buckhorn.

SPACECRAFT Okay, and we're briefing right now, so

END OF TAPE

CAPCOM Columbia, Houston with you through Buckhorn for 2 minutes, over.

SPACECRAFT Sure go ahead.

CAPCOM Roger, we read you loud and clear, we're standing by through Buckhorn.

SPACECRAFT Okay, and we're briefing right now, so we'll continue that.

CAPCOM Roger.

CAPCOM Columbia, Houston, we're 30 seconds to LOS, we'll talk to you again through Botswana at 6 plus 55.

SPACECRAFT Okay, see you there.

PAO This is Mission Control Houston, Loss of Signal through Buckhorn, next station in 35 minutes will be Botswana. Meanwhile, the crew of Columbia are reviewing the procedures for deploying the SBS, which is now an hour and 39 minutes, just slightly over one full orbit away. We'll return at Botswana. At Mission Elapsed Time 6 hours 19 minutes, this is Mission Control Houston.

PAO This is Mission Control Houston, 40 seconds away from acquisition at Botswana.

CAPCOM Columbia, Houston with you through Botswana for 6 and 1/2 minutes, over.

SPACECRAFT Okay, loud and clear.

CAPCOM Roger, read you loud and clear.

SPACECRAFT And Houston, we're starting into the deploy hook, sort of getting set up.

CAPCOM Roger, we copy.

CAPCOM Columbia, Houston, we're 30 seconds from a short LOS, we'll talk to you through IOS at 7 plus 03.

SPACECRAFT Okay, Mike, and we have began the predeploy pam check on page 5-5, we are checking out the backup SCA, that is SCA 1. It is enable at this time.

CAPCOM Roger, we copy Bill.

CAPCOM Columbia, Houston, with you through IOS for 6 minutes, over.

SPACECRAFT Okay Mike, we have completed the predeploy checks, we have SCA 2 now selected as the prime SCA and we have completed all the operating steps up through the bottom of page 5-7, we're standing by for the deploy operations, everthing is down the middle of the road, no suprises, the To Batt temp is 82, Solid temp is 75 and we still have only positions 1 and 2 indicating closed, 3 indicating blank on the sunshield. Other than that, everything has been exactly nominal.

CAPCOM Roger, we copy that, Bill.

SPACECRAFT And we'll be just a little bit slower here going through some of these, cause I'm down to 1 tube, with CRT 2 out. And we just saw you put the payload recorder panel control to gray.

CAPCOM Roger, say again?

CAPCOM Roger we copy that.

SPACECRAFT And Mike be advised, we found the water hose and connected it all up.

CAPCOM Roger, we copy.

SPACECRAFT And for the status of our operations, we are at the top of pages 5-8, 5-9, standing by for 40 minutes for orbiter operations and 25 minutes for the PAM operations.

CAPCOM Roger, we copy.

SPACECRAFT (garble)

CAPCOM Columbia, Houston, go ahead.

SPACECRAFT Okay Mike, just a note of interest. On daylight side passes, looking aft we see a little rings, and little bits of ice, apparently coming off the main engines, I'm sure it's normal, just, we'll see a strip slightly curved, a strip maybe a couple of feet long, come off and spin away very slowly.

CAPCOM Roger, we copy that.

END OF TAPE

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SPACECRAFT (garble). We see little rings, little bits of ice apparently coming off the main engines. I'm sure it's normal just a little (garble) strip cycle slightly curved strip maybe a couple feet long come off and steer away very slowly.

CAPCOM Roger, we copy that. And Columbia, Houston, we're 30 seconds from LOS. We'll talk to you through Guam at 7 plus 2 9.

SPACECRAFT (garble) about 19 minutes.

PAO Mission Control, Houston. Loss of signal at the Indian Ocean station. 17 minutes away from reacquisition at Guam. Less than, a little bit over half an orbit away from SBS deploy. Should have some live television during the upcoming Hawaii pass of the SBS with its spin motion imparted at that time. We'll return in 16 minutes at Guam. Mission Control, Houston at 7 hours 12 minutes.

PAO Mission Control, Houston. We have acquisition through the Guam tracking station.

CAPCOM Columbia, Houston with you through Guam for 4 and one half minutes. Over.

SPACECRAFT Roger, Houston.

CAPCOM We read you loud and clear.

SPACECRAFT Mik, we're in the maneuver to the deployers.

CAPCOM Roger, we see that and Bill we'd like to verify that you have the restraint index memory address list on board.

SPACECRAFT That's verified. We have it on board. It's in the payload system theatre map book.

CAPCOM Roger, we copy.

CAPCOM And Columbia, Houston, we're going to lose you for a few seconds through keyhole.

SPACECRAFT Okay Mike.

CAPCOM And Columbia, Houston, we're with you again for a minute and a half.

SPACECRAFT Okay, Mike. And Mike, I assume you guys are double checking your attitude make sure we're not making any mistakes up here, right?

CAPCOM Roger, Columbia. Your attitude looks good to us.

SPACECRAFT Okay.

CAPCOM And Columbia, Houston, we're 20 seconds to LOS. We'll see you over Hawaii at 7 plus 41. We're looking forward to TV and once again you guys got a good attitude up there.

SPACECRAFT Okay Mike, and that's fine. We're all set for the little bit of cabin TV. And Mike should have the cameras out and delta to you through 12. It's a gorgeous site.

CAPCOM We copied you.

PAO Mission Control, Houston. LOS in Guam. 6 minutes away from reacquisition through Hawaii where the onboard television cameras in the payload bay will show a picture of SBS being spun up as the crew goes through the deploy operations checklist. And now some 23 minutes away from ejecting SBS from the payload b.v. We'll return for the Hawaii paths in 6 minutes at 7 hours, 34 minutes, Mission Control, Houston.

PAO Mission Control, Houston. We have acquisition at Hawaii at this time. We have now a photo, television picture, from Columbia.

CAPCOM Columbia, Houston with you over Hawaii for 8 minutes.

SPACECRAFT Roger, Mike. We've started mechanical sequence. The starboard restraint is up, the port restraint is coming, we've got .2 and .19 are on a current.

CAPCOM Roger, we copy and we've got good television down here.

SPACECRAFT Okay, and would you check your index, insert inhibit relay from the ground. I'm not sure I have the right addresses. I got no change when I flipped the switch I did get the out on the direction motors to change on 207, but even my addresses for the restraint motor direction did not flip-flop on me so I think I may have wrong addresses.

CAPCOM Roger, Bill. Everything looks good to us right now.

SPACECRAFT Okay, and the port restraint is out. Here comes the stats.

CAPCOM Yes, we see it down here Bill. It's beautiful.

END OF TAPE

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SPACECRAFT The port restraint is coming and we got .2 and .19 are on the current.

CAPCOM Roger, we copy and we've got good television down here.

SPACECRAFT Okay, and would you check your index insert inhibit relay from the ground, I'm not sure I had the right addresses, I got no change when I flipped the switch, I did get the out on the direction motors to change on 207, but even my addresses for the restraint motor direction did not flip flop on me, so I think I may have wrong addresses.

CAPCOM Roger, Bill, everything looks good to us right now.

SPACECRAFT Okay and the port restraint is out, here comes the stats.

CAPCOM We see it down here Bill, it's beautiful.

PAO And SBS is spinning.

SPACECRAFT Okay Mike, we're at 52 coming back, 51 rpm.

CAPCOM Roger we copy, you guys look good.

SPACECRAFT Just like Huntington Beach Mike. That state control circuit there (garble) about twice then seems to settle on down.

CAPCOM Roger, we copy Bill.

SPACECRAFT I'm going to activate the spacecraft.

CAPCOM Roger, and we're getting super TV down here.

SPACECRAFT Okay, and I noticed that the (garble) rates have really (garble) Mike on the universal pointing.

CAPCOM Roger we copy.

SPACECRAFT SBS is configured on ASC 1 (garble) for interal power.

CAPCOM Roger, we copy.

PAO Flight Director, John Cox pulling the positions here, go for deploy.

SPACECRAFT And Mike, you can tell Al Pennington that the PDI D-COMM FDA works properly here in the vehicle, it never did in

the SMS, we got the down arrow, has disappeared for input 4.

CAPCOM Roger, we copy.

SPACECRAFT And Mike if you asked for the Item 8 internal power, I missed it.

CAPCOM Okay Bill. We just now got it, you have a go for internal power.

SPACECRAFT And you have internal power.

CAPCOM Roger, we see it (garble) there.

SPACECRAFT Looks like they got a beautiful day in the Hawaiian Islands today, Mike.

CAPCOM Roger, we copy that.

SPACECRAFT This window this time just gave me a beautiful view, looking right down on them.

CAPCOM We sure got a beautiful view of the payload back there, and the aft flight deck.

SPACECRAFT Super, you may find this hard to believe Mike, but in just a minute or so, I'm going to go take my first look at it.

CAPCOM You're right Bill, we find that pretty hard to believe.

CAPCOM And Columbia, Houston, everyone down here is go for deploy, with 2 minutes left over Hawaii.

SPACECRAFT And so is everyone up here.

CAPCOM And Columbia, Houston, with 1 minute to go over Hawaii. Santiago AOS is 8:11:02, we're looking forward to a good deploy report, everything looks right on the money to us down here right now.

SPACECRAFT Okay, we'll see you there, we're looking forward to one too. See you shortly Mike.

CAPCOM Roger, you guys have a good one.

SPACECRAFT Thank you Mike.

PAO This is Mission Control Houston, Loss of Signal at Hawaii, about 8 minutes away from when the crew of Columbia will deploy SBS. The television picture through Hawaii showed the satellite spinning at approximately 52 revolutions per minute,

all systems aboard SBS appear to be normal at this time, and at Santiago about 20 minutes from now, we should get a report from the crew on the deployment. The spacecraft will be deployed about 1200 nautical miles west of the Galapagos Islands at 109 degrees west longitude approximately, as orbit 6 crosses the equator. The springs that push the satellite out of the cradle are preloaded to approximately 1400 pounds compression, and will impart about 3 feet per second, velocity away from the orbiter. Some 30 minutes after deploy, Columbia will be maneuvered in a posigrade direction of about 16 feet per second in the so called separation maneuver, so that the orbit then will be nine miles higher at perigee. The 160 by 169 nautical miles. That is 15 minutes after the deploy maneuver, and then 30 minutes later it will be above and behind the satellite, at some 18 miles. This is one of the many paradoxes of space flight where you speed up to slow down. Being in a higher orbit, the period is longer, therefore you begin to fall behind another object travelling in the original orbit. The SBS weighs some 2300 pounds at the time of deploy, however,

END OF TAPE

PAO The SBS weighs some 2300 lb at the time of deploy. However, after both of the upper stages have done their thing, the weight is down to 1300 lb. The perigee kick motor which will ignite some 45 minutes after deployment, will boost the satellite up to 22,300 nautical miles at apogee. The perigee will remain at 160 until the apogee kick motor is fired several days from now by Ground Command. Eighteen minutes from acquisition at Santiago. Five minutes away from deploying SBS. This is Mission Control at 7 hours, 52 minutes.

PAO Mission Control, Houston. We have AOS through Santiago.

CAPCOM Columbia, Houston with you through Santiago for 2 minutes. Over.

CAPCOM Roger. Go ahead.

CAPCOM Roger. Those numbers sound awful good there.

CAPCOM Roger. We copied all the numbers Bill. How do you read?

CAPCOM Roger. We're really looking forward to seeing that Bill.

SPACECRAFT Mike, we hope the TV comes out. It doesn't play back very well on our monitor but we're relatively sure we got it and we, by the way, still have that beautiful satellite in sight. It's travelling just below us.

CAPCOM Roger. We copy Bill and Joe and got a lot of happy people down here. You guys did good work.

CAPCOM Roger, we copy.

CAPCOM And Columbia, Houston. Everything's looking good for the burn. We're 30 seconds to LOS and we'll talk to you again through Botswana at 8 plus 31.

CAPCOM Roger. We concur.

PAO Mission Control, Houston. SBS was successfully deployed on time and in the proper attitude. We deliver as the crew said, early in the Santiago pass. Sixteen minutes to next acquisition which looks like is Indian Ocean and in the following Hawaii pass we ought to get a replay of the onboard recorded television of the deployment sequence itself which Joe Allen said ought to look pretty good, at least from their monitoring of the television onboard. A little bit of handshaking here with the Deputy Administrator of NASA, Hans Mark, congratulating the Flight Control Team for successful deployment of SBS. Returning

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in 15 minutes for Indian Ocean station. Mission Control, Houston at 8 hours, 15 minutes.

PAO Mission Control, Houston. Forty seconds away from acquisition of Columbia through Botswana voice relay station. Should have a report on the separation burn at this time. We're some 13 minutes away from ignition of the perigee kick motor on the SBS satellite. At the time of ignition, the Columbia should be roughly 18 nautical miles above and behind SBS, belly toward the satellite. They will not be able to see it nor photograph it or make TV pictures of the ignition from that attitude.

CAPCOM Columbia, Houston. We're with you through Botswana for 5-1/2 minutes. Over.

SPACECRAFT Okay, Houston. Loud and clear.

CAPCOM Roger. We read you loud and clear and we'd like to get a post burn report when you have a chance.

SPACECRAFT Yeah. It was a good burn. Completely nominal, ontime, no residuals, no anomalies of any kind.

END OF TAPE

CAPCOM Columbia, Houston with you through Botswana for 5 and one half minutes. Over.

SPACECRAFT Okay, Houston. Loud and clear.

CAPCOM Roger, we read you loud and clear and we'd like to get a post burn report when you have a chance.

SPACECRAFT Yes, it was a good burn. Completely nominal on time, no residuals, no anomalies of any kind.

CAPCOM Roger, we copy that. We'd like you to verify that camera delta is off. We see the COM Fault message caused by a high camera temperature and we want to know if you turned off camera delta.

SPACECRAFT Mike, that's verified off. It may have been getting some fairly direct sun, and we had it on during the deploy but turned it off shortly thereafter.

CAPCOM Roger, Joe. We copy. Thank you.

SPACECRAFT And after the burn, we looked out through the minus Z windows and watched the PAM SDS 3 go beneath us and we tracked them till we crossed over the terminator.

CAPCOM Roger, we copy Vance and we got a flight note here concerning the flash evaps if you got a second.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, we'd like you to go ahead and turn the flash evap control primary A to off on panel 11, and no water dump will be required tonight. But turn off that fast, we may raise the cabin temperature a little bit, and if it gets warm in there, the cabin temp control procedure is on the orbit OPS checklist, page 5-7. And if the temperature does go up, it may raise the cabin pressure a bit. If you get that cabin atmosphere caution warning due to a high cabin press, you can raise the cabin pressure limit. That's channel 4 on the caution and warning. And you can raise that to 3.85, revise 3.8.

SPACECRAFT Okay, copy. Tonight, well first of all, I just turned on FES prime A, no water dump tonight, cabin temp may rise. If so, follow procedure on orbit OPS 5-7 and if we're bothered by an alarm caution warning channel 4 should go to 3.80.

CAPCOM Roger, it's 3.80 now Vance and you can raise it to 3.85 if it humps against an upper limit.

SPACECRAFT Okay, copy.

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CAPCOM And Columbia, Houston we'd like to verify that you turned FES primary A to off.

SPACECRAFT That's verified.

CAPCOM Roger.

SPACECRAFT And, Mike, how would you like to have us manage the topping evap heater duct? Leave it in A for a while.

CAPCOM Roger, Vance. We'd like you to leave it in A for awhile please.

SPACECRAFT Okay. Mike when you got a minute I got a question for you.

CAPCOM Go ahead.

SPACECRAFT Okay, this is Bill. Looking ahead to the VTR dump. What points of the deploy do you want. Do you want just the deploy or do you also want the mechanical sequence?

CAPCOM Stand by Bill.

CAPCOM And Columbia, Houston, we'd like to get the VTR dump about deploy minus 5 minutes through the deploy.

SPACECRAFT Okay, understand. You're not interested in mechanical sequence. You just want the deploy part.

CAPCOM Roger. We saw the mechanical sequence start before and we'd just like to get a few minutes before deploy and then a few minutes after deploy. And we're going LOS right now. We'll talk to you through IOS in about 2 minutes.

SPACECRAFT Okay.

END OF TAPE

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CAPCOM And Columbia Houston, with you through IOS for 8 minutes, over.

SPACECRAFT Okay, loud and clear Mike.

CAPCOM Roger, and reference the VTR dump, we'd like to leave it up to you. We'd like to see the deploy and the, however much you think would be good to see after that.

SPACECRAFT Okay, Mike, I'll get you that. Tell me how long the pass is going to be.

CAPCOM Okay, we got a 7 minute pass at Hawaii, Bill.

SPACECRAFT Okay, I'll set up to use about 5 of it, so if we're running a little slow.

CAPCOM Roger, we'd like to see a good deploy, and as much after that as we can.

SPACECRAFT Okay Mike, and one comment for tomorrow, on the G-MEM addresses that I had for the restraints and the indices the index insert inhibit and the motor reverse relay in particular, I called them up on SPEC 0, and tried to verify them changing state and I got nothing changing state, with one CRT, I just didn't have time to mess with it. We did get it on 207, so we proceeded. Could you send me a teleprinter of the appropriate G-MEM addresses for telesat and I can use CRT 4 tomorrow to verify those without getting in Joe's way.

CAPCOM Roger, Bill, we've already been working on that, and we'll have that available for you.

SPACECRAFT Okay, also indicate, not only what (garble) it is, but which way indicates on and which way indicates off.

CAPCOM Roger, Bill, we'll have that for you.

SPACECRAFT Give me the address, the bit number, and which is 1 and which is 0, and I can figure out all the possibilities for that individual bit.

CAPCOM Roger Bill.

CAPCOM And Columbia, Houston, we see ignition on the PKM.

SPACECRAFT Super, outstanding, and we're sitting at the attitude you want us at.

CAPCOM Roger, we copy.

SPACECRAFT Which is another way of saying, we don't see the ignition.

CAPCOM Roger we understand.

CAPCOM And Columbia, Houston, we're 45 seconds from LOS we'll talk to you through Guam at 9 plus 06, you'll be glad to hear that the PAM burn was nominal, it's on it's way to geo sync, and the SBS director would like to pass along his thank you and congratulations.

SPACECRAFT Well thank you, and thank them for us Mike, and give them our congratulations and good wishes, and we would like to hear about the apogee burn whenever it happens in a day or so.

CAPCOM Roger that.

SPACECRAFT Houston (garble)....

PAO This is Mission Control Houston. Through the Indian Ocean station, the SBS perigee kick motor was observed to ignite on time, perfectly nominal burn. The SBS is now on its way out to apogee of 22300 miles. The perigee kick motor has separated from the spacecraft. Next station up coming will be Guam in 17 minutes. At 8 hours 49 minutes in day one of STS-5, Mission Control Houston.

PAO Mission Control Houston, acquisition through Guam for about the next 7 minutes.

CAPCOM (garble) over Guam for 2 minutes, over.

SPACECRAFT Loud and clear Houston.

CAPCOM Roger, we read you loud and clear.

SPACECRAFT And we've got the TV set up for the Hawaii dump and my intent is to give you about a 1/2 minute worth of spin and then the deploy, and as much following that as you would like. it looks like there's a (garble) on a sun problem where the sun has washed out the PAM, but if you have patience it will come back in, when the Earth comes in the scene.

END OF TAPE

CAPCOM (garble) over Guam for 2 minutes. Over.

SPACECRAFT Loud and clear Houston.

CAPCOM Roger. We read you loud and clear.

SPACECRAFT Now we've got the TV set up for the Hawaii dump and my intent is to give you about a half a minute's worth of ascent and then the deploy and as much following that as you would like. It looks like there is a fair amount of sun problems where the sun has washed out the PAM but if you have patience it will come back in when the Earth comes in the scene.

CAPCOM Okay. We copy that and be advised that the INTLSAT tracking station at Yammagootchie had a good track on the satellite. It looks like a less than average coning. Indications that the omni deployed okay and they're ready for transfer orbit ops.

SPACECRAFT Outstanding. Very, very good. Mike, I'm assuming that when you were looking at the mechanical sequence, the sunshield opening in the spinout itself, that you did tape that, that you have that on the ground already.

CAPCOM That's affirmative Bill.

SPACECRAFT Okay. I'll just give you the deploy part then.

CAPCOM Roger.

CAPCOM And Columbia, Houston. We've got about 50 seconds left over Guam here. I've got a note concerning the hydraulic thermal conditioning if you've got a second to copy.

SPACECRAFT Go ahead Mike. Ready to copy.

CAPCOM Okay. We're seeing the hydraulic temperatures decreasing in the body flap area. They're following predicted trends but they're 5 to 10 deg colder. In order to have the maximum control over the temperatures from the ground via TIMBU's, in addition to having the circ pump switches in GPC during your sleep, we'd like you to do the hydraulic thermal conditioning enable in the orbit ops checklist on page 1-2.

SPACECRAFT Orbit ops checklist, page 1-2, hydraulic thermal conditioning enable. We'll get on it.

CAPCOM Roger. And we're going LOS. We'll see you over Guam at 9 plus 17.

CAPCOM Over Hawaii at 9 plus 17.

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SPACECRAFT Okay. We'll meet you there with the TV camera.

CAPCOM We're looking forward to it.

PAO Mission Control, Houston here. LOS at Guam, 7 minutes away now from Hawaii where the crew will feed down video tape recording of the SBS satellite deploy from toward the end of the activation sequence through the actual deployment and as the spacecraft moves away from Columbia and the Earth comes into view beneath. Another major first in this flight, the satellite deployment sequence. We'll return in 6 minutes at Hawaii. Mission Control, Houston at 9 hours, 10 minutes.

PAO Mission Control, Houston here. Thirty-five seconds until acquisition through Hawaii. Video tape dump here of the pam deployment SBS and pam deployment sequence. Almost 1 orbit ago. SBS now on its way to first apogee of some 22300 nautical miles.

CAPCOM Columbia Houston, with you over Hawaii for 7-1/2 minutes. Over.

SPACECRAFT Okay Mike. We're with you. Give me some words as to when you want the dump.

CAPCOM Roger. We're ready for the dump.

SPACECRAFT Here comes the VTR now. Mark.

CAPCOM And we're receiving a good TV.

END OF TAPE

CAPCOM To the dump now.

SPACECRAFT Here comes the VTR now, mark.

CAPCOM And we're receiving a good TV.

SPACECRAFT (garble) the audio's with it.

CAPCOM And Columbia, Houston, you can expect a PSP message. We're getting ready to turn off the Payload COMM system.

SPACECRAFT Okay. And the hydraulic thermal condition enable was completed, page 1-2 Mike.

CAPCOM Roger, Bob. We see you that. Thank you.

SPACECRAFT If you got a second, you might pass some words to the habitability guys. I've been trying the suction cup shoes most of the day, and they really haven't been doing me that much good. They kind of hold when you don't want them to hold and let go when you want them to hold.

CAPCOM Roger, we copy that Bob.

CAPCOM And Columbia, Houston, we've got a super shot of the payload coming out.

SPACECRAFT Out of curiosity, is it overdriven?

CAPCOM No, we're starting to get a little blooming here about 30 seconds after deploy, but it looks real good.

SPACECRAFT Okay, fine. We get a fair amount more of blooming than you do apparently. And Mike, I'd like one more additional word to that comment about the suction cup shoes.

CAPCOM Go ahead Bob.

SPACECRAFT We went ahead and mounted on the aft flight deck the portable toe restraints, or the paste on toe restraints, and they're really working great. I've used them back there and the guys who were back there for the deploy used them and those are really outstanding. I think right now we kind of wish we had a couple more, like 4 of them, up in that aft area there right now.

CAPCOM Roger, we copy. And Columbia, Houston, we'd like to send up some variable parameters. We'd like Spec 1 on GNC machine please.

SPACECRAFT Again Mike.

CAPCOM Roger, I say again we'd like a Spec 1 on a GNC machine please.

SPACECRAFT Out on 1 there Mike.

CAPCOM And Columbia, Houston, INCO has suggested that for tomorrows deployment we might change the LC modes to peat vice normal to reduce some blooming a little bit.

SPACECRAFT Okay, we'll take tha note and we'll do exactly that.

CAPCOM And Columbia, Houston, the variable parameters on board the CRT is used again.

SPACECRAFT Roger.

CAPCOM And we're looking at a beautiful shot of the earth down here.

SPACECRAFT You ought to see it from here.

CAPCOM I wish I could.

SPACECRAFT You will.

CAPCOM And Columbia, Houston, we're about 25 seconds from LOS. We'll see you again over Santiago at 9 plus 44 and we've got a good shot of the satellite against the earth background.

SPACECRAFT Okay, Mike. We'll see you at Santiago and I'll go ahead and secure the VTR.

CAPCOM Roger, we're losing the picture now.

PAO This is Mission Control, Houston LOS Hawaii. There's some fairly spectacular video tape of SBS satellite deployment was played back by the crew. Satellite moved away at a fairly healthy rate. The force imparted by the springs and at the tail end of that VTR played back the satellite had descended below the earth horizon as far as the point of view of the camera, and we came a little bit more contrasty as opposed to against the black mass of space. We're 17 minutes now away from the next station at Santiago at which time we shall return. Mission Control, Houston, at 9:26.

END OF TAPE

PAO ...We're at 17 minutes now away from the next station at Santiago, at which time we shall return. Mission Control, Houston at 9:26.

PAO This is Mission Control, Houston. One minute away from a playback of the SBS deployment television from Columbia. Accompanying that second playback will be the audio from the preceding orbit Santiago pass in which the crew confirmed that the SBS had been deployed. An early part of that pass somehow was lost in a configuration problem as they say in the audio circuitry, so that missing tape will be played along with the video from SBS deploy. Sixty, or 12 seconds away from starting of that playback. Mission Control, Houston. That completes the playback of the dumped video tape from SBS deploy and we are now in acquisition through Santiago.

CAPCOM Columbia, Houston with you through Santiago for 5-1/2 minutes. Over.

CAPCOM Roger Vance. We're with you now through Santiago for 5-1/2 minutes. We're getting some spurious air to ground 2 downlink. We'd like you to check your audio panels to see if anyone of them has air to ground 2 in the transmit/receive mode.

CAPCOM And the teleprinter is okay as it is.

SPACECRAFT Mike, we just checked the panels we're all hooked up to and air/ground 2 is in receive.

CAPCOM Roger. We copy. Thank you much.

SPACECRAFT And Houston, I have a report to make.

CAPCOM Columbia, Houston. Go ahead.

SPACECRAFT Mike, on the port OMS pod, we've noticed that there are a couple of nicks in tile and you might like to notice those on the TV that you get back. Actually, they're like chips out of 2 tiles on the leading edge of the OMS pod They don't like too much to be concerned about.

CAPCOM Roger. We copy. In the port OMS pod you have a couple of chips out of 2 of the tiles on the leading edge of the OMS pod.

SPACECRAFT That's affirm.

CAPCOM (garble)

SPACECRAFT It looks like we're looking at the SIP right under it. (garble)

CAPCOM Okay. We copy.

SPACECRAFT And Mike, we've got the IMU align log for that last IMU that we torqued at 93305.

CAPCOM Okay. Go ahead.

SPACECRAFT Okay. That was star 27 and 36. (garble) was 0.01. The dump axes all three of them plus 0.01 minus, 0.18, minus 0.10. Delta Y plus 0.04, minus 0.04, minus 0.05. Deltz 3 minus 0.05, plus 0.04, minus 0.23. And I gave you the (garble) timers 9 hours, 32 minutes, 5 seconds. And we're waiting till a little bit of darkness here so we can get a (garble) count.

SPACECRAFT Houston, Columbia.

CAPCOM Roger. We copy that.

SPACECRAFT And we're just coming through the Pacific on t the South American west coast now. Obviously, just like you say, it sure looks pretty down there on those Andes. We see some snow and it's nice to have Santiago on the network.

CAPCOM Roger. We concur with that Vance.

SPACECRAFT Wish we could go a little further south in their country and see the Andes where they get higher. Maybe another orbit.

END OF TAPE

SPACECRAFT Just like to say, we're, it sure looks pretty down there on those Andes, we see some snow. And it's nice to have Santiago in the network.

CAPCOM Roger, we concur with that Vance.

SPACECRAFT Wish we could go a little further south in that country and see the Andes where they get higher. Maybe another orbit.

CAPCOM Roger that Vance.

SPACECRAFT And Mike, just for your information, Our front windows are really badly smeared, like, I noticed when I got in on my side here, they were very badly smeared right on the pads from like a salt film when you get this low sun like we got right now, looking at the front windows it's just almost like you're looking through fog, it's so bleary.

CAPCOM Okay, we copy that Bob, thank you.

CAPCOM And Columbia, Houston, we're 30 seconds to LOS, we'll talk to you through Ascension at 10:01.

SPACECRAFT Okay, we'll see you there.

CAPCOM Columbia, Houston with you through Ascension for 2 minutes, over.

SPACECRAFT Roger Mike, I was in the middle of trying to get a cross line here.

CAPCOM Roger, we copy.

CAPCOM And Columbia, Houston, we're 30 seconds to LOS, we'll talk to you through IOS at 10 plus 16.

SPACECRAFT Roger Mike.

CAPCOM And Columbia, Houston, can you tell us if you've activated the gas yet?

SPACECRAFT Mike, this is Bill, I took a quick stab at it here and it appeared to be misbehaving and I dropped it to come to the LiOH cannister replacement, the systems I had, it may just be a screw loose in the operator here, I would hit the clear and I would get the A dash dash A, I would put in the 001, and I would get the A01A as I should, but than rather than dropping to a A01L, it would drop to a A01- and that was all I could ever get it do, so I quit fooling with it temporialy.

CAPCOM Okay Bill, we'll check with you through IOS.

PAO This is Mission Control Houston, LOS through Ascension Island, Indian Ocean station in 11 minutes. Crew winding down they're activities of the day. Getting into a scheduled meal period, and pre-sleep activity on this 8th orbit. Be back in 11 minutes, or Indian Ocean station, Mission Control Houston at 10 hours 5 minutes.

END OF TAPE

PAO Mission Control Houston, acquisition through Indian Ocean station for the final pass of the day.

CAPCOM Columbia, Houston, with you over the Indian Ocean station for 5 minutes, over.

SPACECRAFT Roger, Michael, we copy.

CAPCOM And Columbia, Houston, I hate to interrupt your meal, we're a little confused on the gas explanation that Bill gave, if he could step through that again, we'd appreciate it.

SPACECRAFT Well, if you think you're confused, you ought to try me. No, Mike, I connected it up and as I read that decal and remember from training, it's fairly simple, unfortunately I'm not looking at it right now. You hit the clear button and the first thing you look at is A--A, and then you key in the relay that your talking about, in this case is 01, and you're immediately looking at A01A, and then that should switch, I thought to a A01L, if it is in fact latent which is should be, and then we send the right thing to get it to go hot, but all I can ever get is A01 dash. Does that make sense to you?

CAPCOM Roger, it didn't make a lot of sense right now, we're looking at it.

SPACECRAFT Okay, we're going to go give it another try, and hopefully we won't spend two days fooling around with it.

CAPCOM Roger, we copy.

CAPCOM And Columbia, Houston, we're 30 seconds from LOS, we'll talk to you again through Guam at 10 plus 42.

PAO This is Mission Control Houston. Loss of signal through the Indian Ocean station. Crew currently in there evening meal. Shortly thereafter they'll begin pre-sleep activities. Next station in 19 minutes is Guam. Meanwhile, the attempts to activate the get away special cannister have been stymied by an apparent problem with the sequencer keyboard. They're trying to sort out what kind of numbers were seen on board, what they mean. We'll return in 18 minutes at Guam, Mission Control, at 10:22.

PAO This is Mission Control Houston, 30 seconds away from acquisition through Guam. We're getting data now for Guam, from Guam as we go into the pre-sleep activity.

CAPCOM Columbia, Houston with you over Guam for 5 minutes, over.

SPACECRAFT Okay, Mike and we figured out the gas problem.

CAPCOM Okay, we'd like to hear about it, tell us.

SPACECRAFT Well you're just not going to believe this, all of our training and all of the simulating, and even our panel here indicates that the gas connects to the center connector on the PAM standard switch panel. And the other standard switch panel it has the the payload timing buffer and the VTR circuit breaker has just the standard I/O nomenclature, by that connector. Well, we tried both controllors and they did the same thing, behave like nothing was answering, so on a whim, I connected it to the other standard switch panel, and guess what happened?

CAPCOM Yes, we were about ready to ask you if you were plugged into that wrong panel there, just because it's labeled gas.

SPACECRAFT Well, you know that's what our training told us to do, we did that in a long sim and it worked.

CAPCOM Roger, that figures.

SPACECRAFT Anyway, we're now plugged into the ox I/O, that's over on the other standard switch panel on L12, and it worked, and gas was activated at 10:38 MET.

CAPCOM Roger Bill, we copy that, well done.

SPACECRAFT Houston, Columbia,

CAPCOM Go ahead Columbia.

SPACECRAFT Roger, did you get our IMU align lock earlier, from somebody?

CAPCOM That's affirmative.

SPACECRAFT Okay, let me talk a little bit about the COAS Calibration. It was fairly difficult and I think partly because we have a little bit of film on the window, and partly cause we had not such a bright star. But it was very hard to get the bias down to a reasonable number, the final thing we came up with was a bias of...

END OF TAP:

SPACECRAFT ...but it was very hard to get the bias down to a reasonable number. The final thing we came up with was a bias of .17. Update time was 10 hours, 15 minutes, but we used probably half of a night pass working on it.

CAPCOM Okay. We copy that Vance.

SPACECRAFT I recommend in the future always try to have a pretty bright star just because of the way the COAS is built.

CAPCOM Roger. We copy.

CAPCOM And Columbia, Houston, we concur with the bright star comment and we're looking at the data.

SPACECRAFT Say again please.

SPACECRAFT Mike, will you say again please.

CAPCOM Roger. Columbia, Houston. We concur with your comments on the COAS cal and we're looking over the data.

SPACECRAFT Okay. Mike, be advised those front windows are really clobbered. That the heavy salt spray, I think, from the Cape and then I had some debris from one of the burns over the Cape on my side also, so they're really pretty bad.

CAPCOM Roger. We copy that.

SPACECRAFT But really, the comment on that further, it depends a lot on lighting, if there's a reflection on the windows. It appears that there's just a thin film of salt and I don't think, for example, it would give us any problem in landing.

CAPCOM Roger. We understand.

CAPCOM And Columbia, Houston, we're 30 seconds to LOS. You should have gotten a weather message up on the teleprinter this pass and we'll talk to you over Santiago at 11 plus 20.

SPACECRAFT Okay. See you there.

SPACECRAFT And Mike, we did get that weather message. It came up very clear.

CAPCOM Okay Joe. Thank you.

PAO Mission Control, Houston. LOS at Guam. No Hawaii pass this orbit. Santiago in 32 minutes, which likely will be the last conversation with the crew except for Ascension shortly thereafter, as the crew winds down the day and prepares to go

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into their sleep period. Returning in 30 minutes at Santiago. Mission Control, Houston. Incidentally, the getaway special cannister has been activated successfully. Apparently the activation controller had not been plugged into the right panel on the spacecraft. Bill Lenor reported that when he did get it attached to the right connector that the getaway special was activated at elapsed time of 10 hours, 38 minutes. At 10:48 Mission Elapsed Time. Mission Control, Houston.

END OF TAPE

PAO ...mission elapsed time. Columbia's out over the South Pacific Ocean at this time on orbit number 8. About to pass within range of the Santiago tracking station. Crew is officially in a presleep period according to the crew timeline, but it's expected there'll be some communication with them very shortly as we check the communications.

CAPCOM Columbia, Houston. With you through Santiago for 5 minutes. Over.

SPACECRAFT Okay, Houston. Roger, loud and clear.

CAPCOM Roger, Vance. We read you loud and clear. We'd like to go ahead and start the crew tagup over Santiago here if we could to get you ready for sleep.

SPACECRAFT Okay. We're chowing up, chowing down a little bit. We'll be listening to you.

CAPCOM Okay, I'll just run over the things I've got. We'd like to congratulate you on a super launch today and an outstanding deploy. Everything just went beautifully down here. The only anomaly we really note today is the CRT 2 failure. We're considering a possible changeout on flight day 5. It's really your option. It's not mandatory. We'd like you to think about it a little bit. Tomorrow we'd like to do the ANIK deploy on SCA 1 and do the backup SCA check on SCA 2. SCA 2 has a failed telemetry channel so we'd like to use SCA 1 for the deploy. Right now we'd like to get SPEC 1 on GNC machine and to send it some variable parameters and a SPEC 60 on the SM machine. We need to inhibit some payload parameters on the SBS. And when you get around to it, we'd like to get the COMM check tonight. And we got one more note on the left OMS cross-feed switch when you're ready to listen to that.

SPACECRAFT Go ahead Mike on the left OMS crossfeed.

CAPCOM Roger, Bob. Sometime prior to sleep we'd like you to place the left OMS crossfeed bravo to B switch and GPC and the talkback should be closed and we'd like to leave it there for the rest of the flight except when you want to either go to the open or closed position and then put it back to GPC. This will preclude a failure similar to the ones we've seen on previous flights where the solder ball bouncing around can take it to the wrong position. This places a conservative. We'd like to leave that switch in the GPC position except when we're moving that valve.

SPACECRAFT Okay, say again the switch. It's the left OMS cross-feed bravo?

CAPCOM That's affirmative. The left OMS cross-feed bravo

switch.

SPACECRAFT Okay. I've got it in GPC now, talkback closed.

CAPCOM Roger, we copy.

SPACECRAFT Okay, Mike. We got the, Joe and I got that comment on the NCA and we appreciate your earlier comment. Joe made the observation earlier that this is probably the first time that people had done the launchers and then turned right around and done the launchers.

CAPCOM Roger, Bill. That's a good observation.

SPACECRAFT And Mike, I've got a number for you if you want to copy it down.

CAPCOM Go ahead.

SPACECRAFT Victor 070 396009 014 008339. That's the serial number on the tile that is directly opposite or next to the tile that is cracked. The tile that is cracked with the chip out of it does not have a serial number showing. That tile number that I read you read directly to the outboard of the tile that is chipped and just slightly to the inboard of the second tile that's chipped. So that's the location in the array where the two tile are chipped.

CAPCOM Okay, we copy that.

SPACECRAFT Mike, tell Woody the jalapenos are outstanding.

CAPCOM Roger, we copy that.

SPACECRAFT Mike, one other thing. Now we're winding down to the end of the day, we'd just like to say we really thought we had a super ride up and we'd like to thank everybody at the Cape that made it that way and everybody in Mission Control. It was a real fine experience for all of us.

CAPCOM Roger, Vance. We really appreciate those words.

SPACECRAFT And Michael, can you look ahead quickly. Do you have a station with TV dump capability coming up shortly?

END OF TAPE

SPACECRAFT ...we'd just like to say we really thought we had a super ride up and we'd like to thank everybody at the Cape that made it that way and everybody in Mission Control. It was a real fine experience for all of us.

CAPCOM Roger, Vance. We really appreciate those words.

SPACECRAFT And Michael, can you look ahead quickly. Do you have a station with TV dump tape capability coming up shortly?

CAPCOM It's a negative Joe. We don't have any TV stations for a long time now.

SPACECRAFT Okay. It's just as well. We got some stuff on tape we'll bring home in a few days, and all sit down and watch it together.

CAPCOM An Columbia, Houston, we'd like to get a time tag on the ASE thermal check if we could.

SPACECRAFT Okay Mike. It was started on the hour, 11:00 MET and it was stopped at 11:05.

CAPCOM Roger. We copy that.

CAPCOM And Columbia, Houston, we're 20 seconds to LOS. We'll talk to you again through Ascension. We'd like to get the COMM check then and then we'll try to let you alone tonight.

SPACECRAFT Okay.

CAPCOM And the CRT's are yours again.

SPACECRAFT Copy.

SPACECRAFT And Mike, I understand, are you still with me?

CAPCOM We're about to lose you Vance.

SPACECRAFT Okay. This is a COMM check to just verify that the sleep configuration COMM is ready to (garble). Is that affirm?

CAPCOM That's affirmative.

PAO Mission Control Houston. Eleven hours, 26 minutes Mission Elapsed Time. Columbia has just passed out of range of the Santiago Chile tracking station. There will be one more communication with the crew as the Columbia passes over the Ascension Island station when they do a COMM check to see that the speaker boxes are configured for the night. Flight controllers here at Mission Control are passing up data for the

crew on how to properly configure all the equipment, setting the alarms on the caution and warning system so that the crew is not disturbed unnecessarily during the night. Heard from all 4 crewmembers during that pass. Bob Overmyer noted that they were eating right now and Bill Lenoir relayed a comment from Joe Allen about their, at the first part of the day being the launchees and turning right around and being the launchers later on in the afternoon. And there was a general passing back and forth of congratulations from the ground and the crew, said they had a real nice ride on the launch. At 11 hours and 28 minutes Mission Elapsed Time, this is Mission Control Houston.

PAO Mission Control Houston. Were about to acquire signal over Ascension Island. Eleven hours 33 minutes Mission Elapsed Time.

CAPCOM Columbia, Houston, with you through Ascension for 8 minutes. Over.

SPACECRAFT Yeah. We got you.

CAPCOM Roger. We read you loud and clear.

CAPCOM And Columbia, Houston, we'd like to verify that you've got the COMM set up for sleep as soon as you get that done.

SPACECRAFT We'll have the COMM set up in a minute Mike.

CAPCOM Roger. We copy.

SPACECRAFT What's our wakeup time tomorrow Mike?

CAPCOM Roger. Wakeup time is MET of 20:00 hour.

SPACECRAFT And Mike, for your info, we've got the (garble) we've got L9 and A13 and A1R done.

CAPCOM Roger. We copy.

SPACECRAFT Mike, how about (garble).

CAPCOM Columbia, Houston, we got a load squeal that last time you broadcast.

END OF TAPE

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SPACECRAFT Roger, we copy. Mike, how do you read something (garble).

CAPCOM Columbia, Houston, we get a loud squelch that time you broadcast.

SPACECRAFT I was too close to the mic. Can you hear me now?

CAPCOM Okay, you're coming through loud and clear now. And Columbia, Houston, how do you read?

SPACECRAFT Mike you're loud and clear.

CAPCOM Okay Joe, we copied you about that time we've been getting a squelch there. We'd like to advise you that your TIMBULLs will be coming up, or are up, and you'll be getting a teleprinter message explaining what they are. We've got some temperature biases we've changed, you'll also get a message on the state vector good, we'd sometime after the sleep period we'd like to turn you over to the planning shift in about a minute and a half, they'll watch you tonight and we'd like to request another perfect deploy tomorrow if it's okay with you.

SPACECRAFT Okay, we've already got that planned and we'll do our best because we deliver.

CAPCOM Roger, we concur with that.

SPACECRAFT And we'll look forward to seeing you tomorrow Mike, thanks all around it's been a fantastic day for us.

CAPCOM Roger and we've got about 45 seconds to LOS, we're going to put you to bed now and we won't talk to you again unless something comes up. We'd like to congratulate you one more time on an outstanding day.

SPACECRAFT Gee thanks Mike (garble) on that speaker.

CAPCOM Okay we got a loud squelch that time Vance.

SPACECRAFT Okay.

PAO Mission Control Houston, 11 hours 43 minutes mission elapsed time. Columbia has passed out of range of the tracking station at Ascension Island starting orbit number 9 in just a minute. Flight controllers here in Mission control will be passing up a teleprinter message to the crew as they pass over Guam in about 33 minutes. Flight control teams here in Mission Control are handing over now. Off-going orbit team of Flight Director Dr. John Cox is going off shift and will be replaced by the planning team headed by Flight Director Gary Coen. CAPCOM's on the planning team are Richard Covey and Jon McBride. At 11

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hours 44 minutes mission elapsed time this is Mission Control Houston.

PAO Mission Control Houston, 12 hours 16 minutes mission elapsed time we're about to pass within range of tracking station at Guam, the crew is already in their scheduled sleep period at this time, but they seem to be running a little bit behind in getting ready for bed, we may hear from them on this pass, we'll find out in a few minutes.

PAO This is Mission Control Houston, Columbia's currently passing over the Guam tracking station, off-going orbit team flight director John Cox is on his way over to building 2 for the change of shift press conference at this time, should be arriving in a few minutes. That press conference scheduled to start 6:50 p.m. Central Standard time, 12 hours, 20 minutes mission elapsed time, this is Mission Control Houston.

SPACECRAFT I'll say, you got your ass in my head right now. Sorry about that, (garble).

END OF TAPE

SPACECRAFT I'll say you've got your ass on my head right now. Sorry about that. (garble) Let me go get that and (garble) I'll tell you what it is called. It is the (garble) 50 millimeter lens. Do you want to use the 50 amp (garble). Okay. We need the (garble).

PAO Mission Control Houston. 14 hours 3 minutes mission elapsed time. Columbia's just passed out of range of the Guam tracking station. On orbit number 10 we're passing out over the South Pacific. Crew is well into their scheduled sleep period. About 2 hours into the scheduled sleep period. Everything seems to be going well aboard the spacecraft. The planning team of flight controllers here in Mission Control is putting together the teleprinter messages to send up to the crew for the morning. Very little in a way of any problems that need to be tracked. Systems continue to look good. 14 hours 3 minutes mission elapsed time. This is Mission Control Houston. Testing. Testing 1 2 3 4 5 5 4 3 2 1 test out. Mission Control Houston. 16 hours 16 minutes mission elapsed time. Things are fairly quiet here in Mission Control at the present time. Flight controllers have prepared the teleprinter message to send up to the crew for tomorrow morning. We are currently considering cancelling the Change of Shift press conference which had been scheduled for about 2:50 a.m. Central Standard Time Tuesday morning or rather make that Friday morning and we will make that announcement a few more times here and if there is no particular interest in holding that press conference we will announce it cancelled probably about 11:15. 16 hours 17 minutes mission elapsed time. This is Mission Control Houston. Mission Control Houston 16 hours 35 minutes mission elapsed time. Things continue to be quiet aboard the spacecraft. The crew about 3 and 1/2 hours remaining in their sleep period. We're still contemplating cancelling the scheduled Change of Shift briefing for this off-going flight control team which would have occurred approximately 2:50 a.m. We will again make the announcement that we are contemplating cancelling that. We'll make that announcement again in about another 15 minutes and if we have no particular interest in holding that conference, given that things are going as quietly as they are, we will announce cancellation of that press conference. Always subject, of course, to in the event that any item of great interest should come about in the remainder of the shift that we would make the Flight Director available to the media should that become necessary. 16 hours 36 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston 16 hours 45 minutes mission elapsed time. Things continue to go quietly in Mission Control as the preparations are begin, are made to start flight day number 2. Crew has about 3 hours 15 minutes remaining in their scheduled sleep period. Our press conference that we had originally scheduled for early Friday morning about 2:50 a.m...

END OF TAPE

PAO ... start flight day number 2. Crew has about 3 hours and 15 minutes remaining in their scheduled sleep period. Our press conference that we had originally scheduled for early Friday morning about 2:50 a.m. at the end of this planning team shift is, we're contemplating cancelling that because things are going very well and there is very little to say in that press conference. This will be the last announcement that we are planning to, and if anyone has any real need to have that press conference be sure and let us know, otherwise, in about 10 minutes or 15 minutes or so we will announce that that has been cancelled with, of course, the option always open, that should anything go amiss during the night, or anything very significant happen that we could reinstitute that if it became necessary. We would naturally announce over the commentary circuit here any problems which might arise that would require that. We also have an indication that there may be a previously unscheduled video downlink in the early morning hours about on REV 15 over the Mila station between 3:17 a.m. Central Standard Time and 3:25 a.m. Central Standard Time or on REV 16 on the Mila pass between 4:53 a.m. Central Standard Time and 4:59 a.m. Central Standard Time. Mission specialist, Joe Allen, had asked before the crew went to bed for an opportunity to downlink some previously recorded video. We don't know yet what the content of that downlink would be, but those are two opportunities early in the crew's day for them to downlink that video and we may expect to see something at that particular time. Again, that would be on orbit 15 between 3:17 a.m. central time and 3:25 a.m. central time or on REV 16 between 4:53 a.m. central time and 4:59 central time. At 16 hours 48 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston 17 hours 18 minutes mission elapsed time. The regularly scheduled change of shift briefing which was planned to occur at about 2:50 a.m. Central Standard Time has been cancelled. We have very little going on. Actually any changes in the status of the spacecraft. No problems at all really to report on. And barring any changes in that we are cancelling that change of shift briefing which had been scheduled for approximately 2:50 a.m. Central Standard Time. Should conditions warrant however, we would make any announcements necessary over the commentary loop here and advise any and all listening of whatever problems might occur. However, at the present time, given no particular need to hold that press conference, we are cancelling it at this time. At 17 hours 19 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston 18 hours 28 minutes mission elapsed time. Columbia is currently on orbit number 15 of the earth passing out over the southern tip of India. Have about 1 and 1/2 hours remaining in the scheduled crew sleep period. The astronauts will begin flight day number 2 during which the Telestat communication satellite is scheduled to be deployed later in the day. We have currently scheduled a downlink of some prerecorded video from the spacecraft that would occur in about 2 and 1/2 hours or near the end of the scheduled crew postsleep

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activity. We do not yet know the subject of that. That was a request by Joe Allen, Mission Specialist, Dr. Joe Allen on the crew, that he have some time some opportunity to downlink some video that he had recorded earlier. And that will be on...

END OF TAPE

PAO ...we do not yet know the subject of that, that was a request by Joe Allen, mission specialist, Dr. Joe Allen on the crew, that he have some time, some opportunity to downlink some video that he had recorded earlier and that will be on orbit number 15 and as we said in about 2 and a half hours. Just to remind you, that change of shift press conference for the off-going flight control team, the planning team, was cancelled earlier this evening, very little going on in the way of problem tracking in Mission Control. The flight controllers here have primarily been involved in repairing the morning teleprinter message, looking at any necessary changes in the flight plan or the crew activity plan although it appears that everything will go as laid out in the book. It was a very nominal day on Thursday, things went off on time and were completed as planned, and we're looking forward to having the same conditions on this flight date two. At 18 hours 30 minutes mission elapsed time, this is Mission Control Houston.

PAO Mission Control Houston 19 hours 32 minutes mission elapsed time, Columbia passing over the Bermuda tracking station on orbit number 14 less than half an hour remaining in the scheduled crew sleep time, this time the ascent entry team of flight controllers is here in the Mission Control room and they're being briefed by their counterparts on the planning team who have spent the hours of the crew's sleep period here. Handover schedule to be complete in about 20 or 30 minutes. Teleprinter messages that were worked on during the night have been sent up to the crew so that they'll be ready for them to see when they get up in about 25 minutes. We have a previously unscheduled television downlink set for orbit number 15 at mission elapsed time 20 hours 58 minutes over the Mila tracking station, that's about an hour and 20 minutes from now, that was as a result of a request by Mission Specialist Dr. Joe Allen for some time or opportunity to downlink some video that he had recorded, don't know at the present times what the contents of that downlink will be. Mission elapsed time 19 hours 33 minutes, this is Mission Control Houston.

PAO This is Shuttle Mission Control, mission elapsed time is 19 hours 57 minutes just about a minute away from acquisition of signal through the Indian Ocean station on orbit 15, the wakeup period occurs in about 3 minutes so we may anticipate some voice contact with the crew during this pass. Flight Director Tommy Holloway, lead Flight Director for STS-5 and director of the ascent and entry team is in the Mission Control Center and presently tagging up with his Flight controllers to make sure everyone is aware of open items and status issues on the Columbia. Anticipating voice contact with Columbia momentarily at 19 hours 57 minutes this is Shuttle Mission Control.

END OF TAPE

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WAKE UP CALL "76 Trombones"

CAPCOM Good morning Columbia, Houston with you, and we trust you slept well.

SPACECRAFT Good morning.

CAPCOM Good morning Columbia, Houston, how do you read? Columbia, Houston, if you'd like we'll give you an encore of that rendition. Columbia, Houston, we're about 40 seconds from LOS here at Indian Ocean. We'll see you at Yarragadee at 20 13. That's about 8 minutes from now.

SPACECRAFT See you there.

PAO This is Shuttle Mission Control at mission elapsed time 20 hours 5 minutes. Had loss of signal through Indian Ocean station. We'll reacquire in about 7 and 1/2 minutes through Yarragadee, Australia. Wake up music was 76 Trombones from the Music Man. The crew will be in the post sleep period, post sleep activity period, undoubtedly configuring the cabin for lighting and it was clear from 1 burster feedback that the speaker box was still activated and there was accordingly little discussion down from the Columbia during this early morning period. We will reacquire again in just slightly under 7 minutes. This is Shuttle Mission Control.

CAPCOM Good morning Columbia, this is Houston with you through Yarragadee for 8 minutes.

SPACECRAFT Okay Houston, we're with you. How do you hear?

CAPCOM Loud and clear Vance, are you guys in the process of reviewing the gap in messages now?

SPACECRAFT Sure are. We enjoyed your wake up...

END OF TAPE

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CAPCOM Good morning Columbia, this is Houston with you through Yarragadee for 8 minutes.

SPACECRAFT Okay, Houston, we're with you. How do you hear?

CAPCOM Loud and clear, Vance. Are you guys in the process of reviewing the gap in messages now?

SPACECRAFT Sure are. We enjoyed your wake up music there and Joe's reading the news to us.

CAPCOM Okay, I've got some voice up gap changes to do for you while you're here. Let me know when you're ready to copy.

SPACECRAFT Standby. Okay Bob, go ahead.

CAPCOM Okay, let's start on page 4-17. At 21 40 the interconnect right OMS to RCS.

SPACECRAFT Okay, that's right (garble)

CAPCOM That's affirm. Right OMS and at 21 50 we're going to dump tank bravo, water tank bravo, to 40 percent.

SPACECRAFT Bravo to 40. We're not going to dump tank alpha?

CAPCOM That's affirm. And on day 1, 0 0 1 5, we want to delete the interconnect return. That's on page 4-20. We want to stay interconnected through the OMS burn.

SPACECRAFT Standby. Give me that time again, Bob.

CAPCOM The day is 0 0 1, MET is, well 0 0 1 5 on day 1.

SPACECRAFT That's the interconnect return, delete that.

CAPCOM That's affirm. We will stay interconnected through the OMS burn so we'll probably going to delete the one at 1 10 also.

SPACECRAFT Okay, we got it.

CAPCOM Okay, a little further down here at 1/0105 we want to delete that interconnect return also.

SPACECRAFT Okay.

CAPCOM That'll do it for awhile Bob, let you get busy and digest those changes. We might inform Joe that we've tentatively set up his tape dump that he wants to do for Mila pass on orbit 15 at approximately 20 58.

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SPACECRAFT Okay, We'll tell him.

CAPCOM If that's not suitable we'll let us know and we'll start working on another pass.

SPACECRAFT Okay Bob, this is Joe, how do you read me?

CAPCOM Loud and clear Joe.

SPACECRAFT Okay it was, it's nothing special and we've already put that tape away. We'll try to generate another one for you today and dump them as we come AOS. How's that sound?

CAPCOM Okay, your call. Just let us know when you want a sight.

SPACECRAFT Roger that.

CAPCOM Columbia, this is Houston for Joe.

SPACECRAFT Go ahead.

CAPCOM Yes Joe, just wanted to remind you that we've only got 3 VTR sights. That's Hawaii island, Goldstone and it'll take us about 1 hour and 1/2 to get sight configured for your VTR dump. So we need at least that amount of time as a lead before you want to dump a tape.

SPACECRAFT Okay Bob, we'll keep that in mind. We'll probably just plan on proceeding as normal. If we get something spectacular we'll give you a couple hours notice.

CAPCOM Okay, thank you. Columbia, this is Houston. we're fixing to leave Yarragadee's call and we'll pick you up at Orroral in about 1 minute.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, with you through Orroral for 4 and 1/2 minutes, standing by.

SPACECRAFT Roger, we copy Bob.

CAPCOM Columbia, this is Houston, we're 10 seconds to LOS and we'll talk to you next at Mila at 20 58.

SPACECRAFT See you at Mila.

END OF TAPE

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CAPCOM ...and we'll talk to you next at Mila at 20:58.

SPACECRAFT See you at Mila

PAO This is Mission Control Houston, at 20 hours 28 minutes had loss of signal through Orroral Valley. Columbia on orbit number 15, just coming across the coast of Australia and will sweep up across the South Pacific, encounter its next ground station at Mila in approximately 30 minutes from now. That will be our next voice contact as the crew goes thru the crew activity plan and updates the CAP with telemetry data sent up thru the teleprinter over night. Mission elapsed time is 20 hours 29 minutes this Shuttle Mission Control.

PAO This is Mission Control at Houston at 20 hours 59 minutes acquisition of signal thru Mila for about eleven minutes.

CAPCOM Columbia, this is Houston with you thru Mila.

SPACECRAFT Okay Houston, go ahead.

CAPCOM Okay, I've got a note to pass you for the upcoming maneuver to IMU align attitude.

SPACECRAFT Okay Bob, just hold a second there. Okay Bob, take it right in the CAP or should I make a note?

CAPCOM You can probably take it right in the CAP, first of all a word of explanation. R4D heaters are not working and in order to keep that jet at a usable temperature above 30 degrees you're going to have to fire them periodically so that we want to use this maneuver align an attitude to get some firing of R4D. So we want to amend the procedures as follows. Prior to this maneuver, deselect jets R2D and R3D. Use a normal jets DAP A for the maneuver to the alignment attitude, do your alignment in DAP B, then after the alignment, go back to vernier DAP A. We're gonna leave R2D and R3D deselected for a while.

SPACECRAFT Okay, let me just repeat it, we're going to deselect R2D and R3D, and we're going to do the maneuver to the attitude on normals DAP A, okay, are we going to the alignment on DAP Bravo, will that be Bravo vernier or Bravo normal?

CAPCOM Standby, Bob. Okay Bob, that will be DAP B normal jets thru the alignment.

SPACECRAFT Okay.

CAPCOM And then after alignment is complete, go back to vernier DAP A, leaving R2D and R3D deselected.

SPACECRAFT We understand.

CAPCOM Okay, sir.

SPACECRAFT It's an early morning down there in Houston for you isn't it Bob?

CAPCOM Boy, you couldn't tell by me, it was awful dark when we came in.

SPACECRAFT Isn't it kind of early, huh? Looks like we all got a real good night's sleep last night.

CAPCOM Well, I hope you did. It's going to be awful hard for you guys to top yesterday though.

SPACECRAFT I know. I tell you that first ride, those first 8 minutes are really something!

CAPCOM Yeah, we suspected that from all the fire and stuff coming out of the backend of the vehicle.

SPACECRAFT Yeah, sure.

CAPCOM I want you to know that you guys have provided us with one of the most boring shift change briefings I have ever gone thru here.

SPACECRAFT Hey, your just going to have to get on (garble) and get them going.

CAPCOM You've got a point there. Columbia, Houston.

SPACECRAFT Ready Bob.

CAPCOM Yeah Bob, we were looking at your jet deselecteds and we show R2R and R3R deselected...

END OF TAPE

Yeah you've got a point there.

CAPCOM Columbia, Houston

SPACECRAFT Ready Bob.

CAPCOM Yeah Bob, we were looking at your jet deselects and we show R2R and R3R are deselected. We'd like to deselect those down jets. That's R2 (garble)

SPACECRAFT (garble)

CAPCOM Okay

SPACECRAFT Okay, I've (garble)

CAPCOM (garble) Bob we show R3A deselected now.

SPACECRAFT (garble) right. I was standing on my head when I did that one and I thought 27 lined up with day, but you're right.

CAPCOM Yes the day looks like, about an item 29

SPACECRAFT I've got 21 and 29 deselects on.

CAPCOM Configuration looks good Bob and we're 30 seconds to LOS, talk to you next through Madrid

SPACECRAFT (garble)

PAO This is Shuttle Mission Control at 21 hours 10 minutes and they have brief loss of signal for about 3 and a half minutes while Columbia crosses the Atlantic and then it acquires again through the ground station at Dakar. During that pass at discussion between Columbia Pilot Bob Overmyer and CAPCOM Bob Stewart having to do with the selection of reaction control system jets. Earlier in that pass the CAPCOM advised that crew that the change of shift debriefing with the off-going flight control team was extremely quick and is a product of the very few anomalies and the problems that have been experienced during the flight, mission Commander Vance Brand suggested they invite the participation of the simulations (or SIM SUP) as he said, which is a simulation supervisor who conducts the simulations that the flight crew and flight controllers use as practice in training devices prior to the mission in which are commonly, are rich with imaginary problems. We'll acquire signal again in 2 minutes through Dakar, this is Shuttle Mission Control.

CAPCOM Columbia, this is Houston, with you through Dakar for 7 minutes, standing by.

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SPACECRAFT Okay Bob. Vance are you on? (garble) Bob we should have the little (garble)

CAPCOM Okay Bob, we see you good configuration now. Columbia, we're 30 seconds to LOS, Indian Ocean is next at 21:32.

SPACECRAFT Okay.

(garble)

SPACECRAFT Roger, I'm afraid we're going to have some obscure during this (garble)

(garble)

SPACECRAFT Between 260 and 280 degrees in azimuth, and elevation the max of 11.15 degrees.

CAPCOM Okay they just advised that over the (garble)

SPACECRAFT Roger

END OF TAPE

CAPCOM Okay, they just advised that over the (garble).

SPACECRAFT Roger.

PAO Shuttle Mission Control 21 hours 32 minutes just moments away of acquisition of signal through Indian Ocean station on orbit 15.

CAPCOM Columbia, Houston's with you through Indian Ocean for 9 minutes, standing by.

SPACECRAFT Okay Bob, how you read me?

CAPCOM Loud and clear.

SPACECRAFT Okay, I just got the IMU alignment results if you want them.

CAPCOM Just a second. Let's see what we can see down here and we'll get what we can't see from you.

SPACECRAFT Okay, I've got SPEC 22, 21 up on CRT 3 and universal point is backed up on 3 (garble) on 1, do you want me to get the startrackers back up?

CAPCOM Standby Bob.

SPACECRAFT We'll need the time of execution and I executed it 0 days 21 hours 32 minutes and 20 seconds.

CAPCOM Bob, I guess we're going to need the torquing angles from you also, and would like to get the startrackers back to track mode.

SPACECRAFT Come back. Okay, I'm back in track and here is the (garble). Okay, got the items 3 and 4. Here's your PAD if you're ready.

CAPCOM Okay, go ahead.

SPACECRAFT Okay, -Y star at 27, -Z star 36, angular error 0.02, (garble) banks is +0.07 -0.48 -0.13, delta Y + 0.02 +0.04 -0.25. (garble) -0.02 +0.04 -0.55 over.

CAPCOM Okay, we have a good copy.

SPACECRAFT And I'll give you a (garble) already, okay?

CAPCOM Yes, we've got that. And Columbia, we don't see the ASC thermal test going yet. We'd like to get that going as soon as possible.

SPACECRAFT Bob, that's in work right.

CAPCOM Okay Joe.

SPACECRAFT And Bob, I'm going up on the, to start up the interconnect now and then I'll go get those heaters reconfigured it will take a minute.

CAPCOM Okay.

SPACECRAFT And Houston, just out of curiosity did we get any firings on R4D's is it warmed up?

CAPCOM Yes Bob, it's warming up a little bit. It kind of gave us a shock because the initial burst of fuel in there cooled it down, and kind of scared us a bit, but it's back up in the 60 degrees now.

SPACECRAFT I tell you it's a good way to wake up everybody onboard here is to fire those nozzles. They...

CAPCOM (garble)

SPACECRAFT Bob, looks like Bob had put the spacecraft in it's stern there.

CAPCOM Say again, that last. You got a very bad barrel effect on this station here.

SPACECRAFT You didn't want to hear the last anyway. Bob, the PAM heater test should be underway now. That ASC thermal test.

CAPCOM Okay, we copy. Thermal test is underway. Columbia, Houston, 30 seconds to LOS at Indian Ocean. Yarragadee will be next at 2 1 5 0.

SPACECRAFT Okay, Bob.

CAPCOM Columbia, Houston, with you through Yarragadee for 8 minutes.

SPACECRAFT Roger, Houston, loud and clear.

CAPCOM Roger, you're 5 by also. We're standing by.

END OF TAPE

CAPCOM Columbia, Houston, we'll be with you at Yarragadee for eight minutes.

SPACECRAFT Roger, Houston. Loud and clear.

CAPCOM Roger, you're 5 by also, we're standing by.

SPACECRAFT Say again Houston.

CAPCOM Roger, we're just standing by, nothing to pass to you.

SPACECRAFT Okay, good. And we're on schedule here this morning. Joe is starting to get set for his tracking with the eye test.

CAPCOM Okay, real good, Vance. You all have been doing great all along.

PAO This is Shuttle Mission Control. Columbia Commander Vance Brand indicating that Mission Specialist Joe Allen was setting up for an eye test, an exercise which has been designed by Astronaut Dr. Bill Thornton to correlate head movement and eye movement in zero gravity and to determine how and whether these might contribute to motion sickness. That experiment will go on in the middeck of the Orbiter, and as the Commander has indicated preparations for that and the associated apparatus are presently being set up. mission elapse time is 21 hours 52 minutes. We're in acquisition of signal period over Yarragadee, with about 5 minutes of voice contact remaining.

CAPCOM Columbia, Houston, we're 15 seconds LOS and we'll pick you up at Orroral in one minute.

SPACECRAFT Roger.

PAO This is Shuttle Mission Control, we're passing thru a brief keyhole here between Yarragadee and Orroral.

CAPCOM Columbia, Houston, with you through Orroral for three minutes.

SPACECRAFT Roger, Houston.

SPACECRAFT Houston through Orroral, how do you read the middeck Mission Specialist over?

CAPCOM Read you five by, Joe.

SPACECRAFT Good morning to you, Roy. Wanted to send thru you a greeting to Joe Kerwin and his family there in Australia. If you all could pass it on. We're thinking about him. These are

some of the things he taught us right now, and I hope he's having an enjoyable stay in the beautiful land of Australia. Please tell him also though that he's one month arrears in paying his coffee dues there in the Astronaut Office. Even though he's not drinking coffee he's still expected to contribute to the coffee fund, over.

CAPCOM Okay Joe, we've got that and we'll be very happy to pass it on.

SPACECRAFT Thank you.

CAPCOM Columbia, Houston, we're ready to power off the SCA.

SPACECRAFT Okay, did you get good data, Roy?

CAPCOM Okay.

SPACECRAFT Have you looked at the data?

CAPCOM Roger, and we're happy.

SPACECRAFT Roger.

CAPCOM Columbia, Houston, if somebody is free I'd like to pass on to you that there are four pairs of foot restraints on board and if you're interested in the locker locations so you can make sure in our checks that you've got them all out. I'll pass it to you.

SPACECRAFT Oh, that's alright Roy. I think we've got the four sets that are in my locker, the PLT's locker. Where are the other ones?

CAPCOM Okay, well the two lockers were MF28 DOFF and MF43 DOFF. Two pairs in each.

SPACECRAFT Okay Roy, we'll get the other two out. They sure are working great in the various locations. You might add that we like the ones with the pillow loop already made vs. the ones with the velcro, pillow loop a little better I think. But we'll get all that on the debriefing later.

CAPCOM Okay, and we'll see you at Buckhorn at 29.

PAO Shuttle Control at 22 hours 2 minutes....

END OF TAPE

CAPCOM Okay and we'll see you at Buckhorn at 29.

PAO Shuttle Control at 22 hours 2 minutes mission elapsed time at loss of signal through Yarragadee. We'll reacquire again in about a half an hour through the Buckhorn station on orbit number 16 during that pass astronaut Joe Allen asked CAPCOM Roy Bridges to pass Columbia crew regards to astronaut Joe Kerwin that vehicle is over Australia at the time and Dr. Kerwin, of course, a NASA astronaut who has been through the Skylab program and is now assigned to Australia on behalf of NASA as a science adviser to the Australian Science Commission, acting as the interface point between NASA activities and the government of Australia. Mission elapsed time 22 hours 3 minutes this is Shuttle Mission Control

CAPCOM Columbia, Houston, with you at Buckhorn for 1 and one half minutes.

SPACECRAFT Okay Houston loud and clear, and we're dumping the water right now and Bill and Bob's still working on the eye movement tests, I mean Joe and Bill.

CAPCOM Okay fine and we have not planned to pass you anything here during your mealtime, but I did have one question for Joe, I wanted to make sure that when he powered down the PAM SCA that he turned off the ISOL PCM power.

SPACECRAFT Standby we'll check. The PAM ISOL power is off, we just verified that and it had been off.

CAPCOM Okay and thank you very much and just a reminder for the future on the PAM ASC thermal test, we do not need to see the data and all we expect you to do is just to bring it up for about 5 minutes and then power it off again and we'll look at the data on the playback and I'll see you at Mila here in about 3 minutes at 34.

SPACECRAFT Okay Roy, very good, and we'll remember the advisory on the test.

CAPCOM Roger.

CAPCOM Columbia, Houston, with you through Mila for 6 minutes.

SPACECRAFT Okay Roy, we got you.

CAPCOM Okay and nothing for you, we'll be standing by.

SPACECRAFT Okay (garble) Roy just had one question about R4D, that has redundant heaters right and one heater doesn't work, is

that confirmed?

CAPCOM Standby. Columbia, Houston, that jet only has one heater that has apparently failed. To keep it warm we'll probably have to fire it periodically.

SPACECRAFT Okay, we couldn't remember how many heaters we had redundancy there or not, thanks.

CAPCOM Okay.

PAO Shuttle Mission Control at mission elapsed time 22 hours 35 minutes, Vance Brand was asking the configuration of a reaction control system jet of a failed heater and was advised by CAPCOM Roy Bridges that the crew would be instructed to fire that RCS jet periodic keep it warm and preclude the chance that it will, in fact get cold to the point where it would be unable to fire and through periodically firings of that system why it will prevent it from freezing up. Still in acquisition of signal previously over Mila for another 10 minutes. Processing data here in the Mission Control Center.

END OF TAPE

CAPCOM ...prevent it from freezing up. Still in acquisition of signal created over MILA for another 10 minutes. Processing data here in the Mission Control Center. Data shows a water dump going on onboard Columbia where the crew is jettisoning the excess water built up as a product of the fuel cell operations and humidity onboard the flight deck is 36 percent and the cabin temperature is 81 degrees and steady. Mission elapsed time is 22 hours and 38 minutes. This is Shuttle Mission Control.

SPACECRAFT We just came into sunlight here. That water dump is really spectacular.

CAPCOM Roger, copy. Wish we could see it.

PAO This is Shuttle Mission Control. Rob Overmyer remarking that the water dump, as the vehicle crosses the terminator into sunlight has just occurred, is a spectacular sight. The water is jettisoned thru a T-shaped nozzle onboard the vehicle. T-shaped in order to neutralize the thrust to make sure that the projection that water doesn't provide any thrust or any dynamic forces in the vehicle by shooting the water up that T-shaped nozzle in opposite directions and thereby preventing any thrust effects. And that nozzle is also heated to keep it from freezing up and as that dumps water, enters the environment around the vehicle it commonly has a very spectacular effect in dispersing sunlight, prompting Rob Overmyer's remarks.

SPACECRAFT Roy, Houston, Columbia mark, right now we are starting the ESU experiment. Mark

CAPCOM Roger.

PAO Shuttle Mission Control at 22 hours and 42 minutes Vance Brand reporting that the crew had begun conducting the head eye movement experiment designed by astronaut Dr. Bill Thornton to help us more precisely understand the possible influences in contributing factors to motion sickness among astronauts in zero gravity. That experiment is being performed by Mission Specialist Joe Allen.

CAPCOM Columbia, Houston, surgeon reports we're getting good data on the experiment.

PAO This is Shuttle Mission Control, Flight Surgeon Jim Vanderplough here in the Mission Control Center monitoring that experiment being done by Joe Allen and indicating to the Flight Director that data looked good on it. It takes some fairly high degree of concentration by Joe Allen to perform the activities involved in that test which correlates eye movement and head movement using some apparatus that are strapped to his head and also which require him to focus on the marks stenciled

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on the wall of the vehicle in the middeck. Columbia on orbit 16 still in acquisition of signal, period about 2 minutes before we lose signal. This is Shuttle Mission Control.

CAPCOM Columbia, Houston. We're curious who the subject is.

SPACECRAFT Again,...again Houston.

CAPCOM Roger, we're curious who your subject is.

SPACECRAFT Okay, that's Allen, is the most talented and Joe on the middeck (garble) Joe is the subject this morning.

CAPCOM Okay, copy Joe.

END OF TAPE

CAPCOM ...their subject is.

SPACECRAFT Okay I (garble) and Joe on middeck, Joe was doing middeck and Bill was the subject one this morning.

CAPCOM Okay, copy Joe.

CAPCOM Columbia, Houston, we're 10 seconds LOS we'll see you at Dakar at 49.

SPACECRAFT Okay Roy.

PAO This is Shuttle Mission Control weve had loss of signal at last exchange verifying for the Flight Surgeon at test subject is as reported Joe Allen. Reacquire signal in 3 minutes through Dakar mission elapsed time 22 hours 46 and a half minutes, this is Shuttle Mission Control.

CAPCOM Columbia, Houston, with you through Dakar for 8 and a half minutes

SPACECRAFT Okay (garble) We're just now stopping the dump.

CAPCOM Roger

SPACECRAFT And Houston, Columbia, just passing some word to you the kind you may be interested in, working on the left, or if you will, the starboard side looking back I can see the first 3 targets 3 4 and 80 very easily. The right side I can, these are the theodolite targets I'm talking about, on the right side I can only see 2, the (garble) the block in, with the PAM's in there I have no problem at all seeing the number 3 target on the back, the 0 target on the back bulkhead. We can hardly tell when we're getting those theodolite readings.

CAPCOM Okay we copy Bob.

PAO Shuttle Mission Control, Bob Overmyer reporting assurance that the theodolite targets are clearly visible in the payload bay doors. Those are targets through which the crew uses a theodolite instrument and surveyor's optical instrument to focus in order to measure the degree of deflection which might occur in the payload bay doors due to an even heating affects on the surface of those graphite epoxy doors. Mission elapsed time 22 hours 52 minutes at about 6 minutes remaining in this pass over Dakar.

SPACECRAFT Houston, this is Columbia you read?

CAPCOM Columbia, Houston, 5 by.

SPACECRAFT Okay just a report we finished the EOG experiment

on me, which is Joe MSP flight 1 talking and I think it went pretty straight forward, you ought to have some data on your recorders when you can dump it. The only difference from center protocol I get the head movement with fixed targets in front of eyes before I get the head movement with eyes fixed on a target straight in front of me. And I think it should be apparent from the eye tracer, we have a good record of what we've done onboard so we can decipher it later if it's not flatty obvious when you first look at it.

CAPCOM Okay, we copy MS21 and standby and I'll see if everybody understands that.

SPACECRAFT And Roy, since I lived through it, Bill's agreed to do it also, so he'll be doing it next.

CAPCOM Okay good. Okay Joe, I would like to pass on to you that the traces just look outstanding and we copy your comments and understand them.

SPACECRAFT Hey Roy, let me relay that to Joe that, hey Joe. Got a super view of the African Continent right now Roy, we've got the nose down looking straight down at it.

CAPCOM Roger, copy and I'll be seeing you over Indian Ocean here about 10 after.

SPACECRAFT Okay we'll be listening.

CAPCOM Columbia, Houston, with you through Indian Ocean for 4 minutes and your 5 by.

END OF FILE

CAPCOM Columbia, Houston, with you through Indian Ocean for 4 minutes. And you're five by. Columbia, Houston. Okay, we'd like just to remind you that when you have a chance go ahead and pick up the fuel cell purge. Okay no problem Bob, but when you get a chance we did not see the fuel cell purge today and I was just throwing in a reminder that when you get finished with what you're doing you might try to get that started.

SPACECRAFT Okay, what page is that listed on?

CAPCOM Okay, that was on top of 418. It's kind of hidden out of the way up there.

SPACECRAFT I see it up there, we'll get it.

CAPCOM Okay.

SPACECRAFT Okay, and Houston, we started the fuel cell purge.

CAPCOM Okay, thank you.

SPACECRAFT And I thank you for the reminder, appreciate it. I went right over that page, I was too busy eating I guess.

CAPCOM Well, I hope you enjoyed your mush this morning.

SPACECRAFT It's just fine.

CAPCOM Columbia, Houston, we're 10 seconds LOS. See you at Yarragadee at 2 4.

SPACECRAFT Okay, Rav.

CAPCOM Columbia, this is Houston, with you through Yarragadee for 8 minutes, standing by.

SPACECRAFT Okay (garble). Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT I started vacuum inerting a little bit sooner than by the CAP. Did Brewster see any of that?

CAPCOM We don't have any data right now, Bob.

SPACECRAFT Okay.

CAPCOM Okay, Bob, Brewster said he did see the start of it and it looked good at the start.

SPACECRAFT Okay. And Houston, this is the middeck, over.

CAPCOM Hello middeck, you're loud and clear.

SPACECRAFT Okay, Bob, Bill's doing the COG experiment now. We did position 4 before we did position number 3 and he's doing position number 5 right now.

CAPCOM Okay, Joe, we copy.

SPACECRAFT Hey Bob, I misspoke. We did 5 before we did 4 and he's doing position 6 right now and as soon as we finish we're going to active the student experiments onboard.

CAPCOM Okay, Joe, we copied. You did 5 before 4, currently doing 6.

(music)

CAPCOM Columbia, this is Houston, we appreciated your spurts of wake up music but we're now all awake.

SPACECRAFT Okay, thought you'd enjoy it.

CAPCOM Columbia, Houston, 30 seconds to LOS. Hawaii is next at 2 3 5 3.

SPACECRAFT Okay Houston, see you there.

PAO This is Shuttle Mission Control. Mission elapsed time 23 hours 30 minutes. Columbia at 17th...

END OF TAPE

SPACECRAFT Okay Houston, see you there.

PAO This is Shuttle Mission Control mission elapsed time 23 hours 30 minutes. Columbia at 17th orbit of the Earth. Just had loss of signal through the tracking stations in Australia. We'll reacquire again in just slightly more than 15 minutes.

CAPCOM Columbia, this is Houston, with you through Hawaii for 5 minutes, standing by.

SPACECRAFT Okay, hi Houston. And Bob, we're more or less standing by here ourselves. Vance is getting ready to get on, never mind I hear it, I guess he's getting on the exerciser and I have just finished the heater G measurements also and Joe is deep into the sponge growth experiment at this point.

CAPCOM Okay, Bill, sounds fine. We probably won't have anything for you until we read up the burn pad for the OMS burn.

SPACECRAFT Okay, and when will you do that?

CAPCOM Well, we'll try to get it to you over the next stateside pass.

SPACECRAFT Okay, that's Buckhorn and as I read this, at the start of that we're going to give you the (garble) strain gauge signal conditioning and at the end of it you'll tell us where to secure it, is that right?

CAPCOM That's affirm.

SPACECRAFT Bob, from the sound of it on the middeck, either Vance is running on the treadmill or somebody's got the world's biggest coffee grinder going.

CAPCOM Yes we copy Bill. By the way Bill, have you figured out how many miles you're going to put in while running on the treadmill today?

SPACECRAFT No, unfortunately, my usual way of measuring miles by how long I run probably won't work up here. I've tried to figure out someway to put a bigger load into my body and make it work.

CAPCOM Well, according to Hank, on flight 4 he ran something like 8,000 miles.

SPACECRAFT If he's going to count those miles, well hell, so am I. With those kind of miles, this will be my biggest week

ever.

CAPCOM Yes sir, I'll bet that. Columbia, Houston, we're about 40 seconds to LOS at Hawaii. Buckhorn will be next at 01.

SPACECRAFT Okay Bob, we'll see you at Buckhorn.

CAPCOM Columbia, this is Houston, with you through Buckhorn for 8 minutes.

SPACECRAFT Okay Bob, and then cover these strain gauges if you want.

CAPCOM Okay Bill, go ahead.

SPACECRAFT Okay, you got the strain gauge signal conditioning. Containers 1 2 and 3 are on.

CAPCOM Okay, we copy that and we'll look for the data. In the meantime I've got OMS burn pads for you if you're ready to copy and your pads will be on the OMS restart burn alpha and bravo cue card.

SPACECRAFT Okay Bob's going to do that now he'll copy. Standby. Let's get those cards out. Okay Bob, I'm reading for restart alpha for a start.

CAPCOM Okay, restart alphas coming up. TV roll 1 8 0, trim load, pitch -0.2 +5.1, right yaw is not applicable. The weight 2 2 3 1 7 4. TIG 0 0 1 / 0 0 4 5 0 0. X7 targets delta VX -1.8, delta VY all Balls delta VZ -0.2. Burn attitude roll 1 6 6 1 8 9 0 3 5, delta V total 1.8:02 VEGO X +1.71 +0.37 ...

END OF TAPE

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CAPCOM Total 1.8:02, VEGO X plus 1.71 plus 0.37 plus 0.49, height of apogee 168, perigee plus 161, over.

SPACECRAFT Okay Bob I'll read back. Left row TD roll 180, landing 0.2 plus 5.1 all balls, weight 223174, (garble) 001004500, (garble) are -1.8 all balls, and minus 0.2, (garble) 166189035, delta V total 1.8, VGO is 02, ZGO is plus 1.71, Y is plus 0.37 (static) plus 0.49, (garble) 168 plus 1.61. How's that copy?

CAPCOM Okay, that's a good copy Bob and on the restart bravo, a lot of these items remain the same I could either read you the full pad or just the changed items, however you like it?

SPACECRAFT Bob you're very hard read, say again please.

CAPCOM Okay Bob on the were start B card, there are a lot of the items that are the same. I can read you the entire card or just the deltas, whichever one you prefer.

SPACECRAFT Give us the deltas

CAPCOM Okay on resert B, first item is the TIG time TIG 001/00:49:05, take seven targets, delta VX -13.3 all balls plus 02.3, under burn data delta V total 13.5, TGO :16, VGO X plus 12.71 plus 02.72 plus 03.64 at of apogee 161 at of perigee 160.

SPACECRAFT Okay Bob, TIG time 001004905 delta VX -13.3 all balls, and plus 02.3 delta V total 13.5, TGO 16, 16 seconds, VGO X plus 12.71, Y is plus 02.72, Z is 0, that's a plus 03.64, 161 minus 160, I mean plus 160 right?

CAPCOM Okay Bob, reconfirm ZGO Y is 02.72.

SPACECRAFT ZGO Y is plus 02.72.

CAPCOM Okay Bob, that's a good copy.

PAO This is Shuttle Mission Control at 1 day 8 minutes, those figures sent up by the CAPCOM were for the flight crew to put the general purpose computers in preparations for this morning's OMS burn budgeted for mission elapsed time of 1 day 46 minutes, or approximately 36 minutes from now the burns of the left OMS engine to satisfy the development test objective for a cold OMS engine restart.

CAPCOM Columbia, we're 30 seconds to LOS, we'll pick you up again shortly here at Mila.

PAO This LOS as the vehicle passes through a brief keyhole over the Gulf of Mexico, Columbia almost directly over Mission Control at Houston right now.

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CAPCOM Columbia, this is Houston with you through Mila.

SPACECRAFT We copy.

CAPCOM Hey Bob, got some more information here for you, you should have a new state vector in target onboard now and for these burns we'd like to remain interconnected to the right OMS, keep your current interconnect configuration, and would also like to leave the left OMS cross page as they are right now so you've got a good configuration, no need to change it as you go through the burn prep.

SPACECRAFT Okay

CAPCOM Columbia, Houston, we have the tile pressure data so you can take those signal conditioners down now.

SPACECRAFT Okay Bob they're off and I was just noticing on panel R15 the audio left circuit breaker ...

END OF TAPE

CAPCOM Columbia, Houston. We have the power pressure data so you can take those signal conditions down now.

SPACECRAFT Okay Bob, their off and I'm just noticing on panel R15 the audio left circuit breaker on the essential IBC is popped out. I'm not sure whether it popped out some time or if we pulled it out unintentionally. Do you want me to reset it?

SPACECRAFT Okay, stand by Bill.
Columbia, Houston, Bill we would like you to go ahead and reset that circuit breaker now while we can watch what's going on.

SPACECRAFT Okay, I just reset it. It stayed in.

CAPCOM Okay. And everything looked good as far as currents here on the ground.

SPACECRAFT Okay, thanks.

CAPCOM Columbia, this is Houston. Go ahead.

SPACECRAFT Okay Bob.

CAPCOM Columbia this is Houston, 20 seconds to LOS and we'll talk to next thru Dakar and Ascension at 0025.

SPACECRAFT And roger, Bob, and we started the maneuver to the burn out.

CAPCOM Okay, we copy. And Bob be advised that the vector on board and on the ground looks like a good solution.

SPACECRAFT I see (garble) degrees in here, Bob,

CAPCOM Columbia this is Houston, with you thru Dakar and Ascension for about 10 minutes.

SPACECRAFT Okay, loud and clear. Houston, Columbia

CAPCOM Go ahead Columbia.

SPACECRAFT Bob, please tell Michelle Issel that her zero gravity crystal growth experiment has just been activated. Its in the battery position and the power light shows very steady green on, so we'll button it up and see how it works. And I'm starting on the sponge growth experiment now.

CAPCOM Okay Joe, I sure she'll be proud to hear that and we'll pass the message on.

PAO This is Shuttle Mission Control at one day 28

minutes. Joe Allen's remark pertained to the student involvement experiments, Michelle Issell's experiment pertains to the formation of crystals in a weightless environment which requires the crew to throw the switch activating the power source to that experiment. And the sponges experiment proposed by Aaron Gillette, a student at Western Carolina State University. It has to do with regeneration of sponge cells in a zero gravity environment and I understand the crews involvement is to activate those experiments and subsequently continues to operate without crew participation. Still in acquisition of signal period for another 7 minutes. Over Dakar. Columbia, on its 17 orbit of the Earth, this is Shuttle Mission Control.

CAPCOM Columbia, we are 30 seconds to LOS. Botswana is next at four four.

SPACECRAFT Okay. And Bob, tell Aaron Gillette that his sponge growth experiment is started, right one is started.

CAPCOM Okay Joe, we copy, the sponge growth is started and things are looking good for the burn now.

SPACECRAFT Bob, we just got a Master Alarm and nothing else, if you see anything?

CAPCOM Roger, we've got you go ahead.

SPACECRAFT Bob, we just got a Master Alarm and we did not see anything. Do you see anything?

CAPCOM Standby.

SPACECRAFT Yeah Bob. It sounded like a vent or something.

CAPCOM Okay, we're searching the MOCR right now, we can't find a reason. You might want to try a memory read on the C&W.

END OF TAPE

SPACECRAFT Yeah, Bob, it sounded like a vent or something.

CAPCOM Okay, we're searching the MOCR and right now we can't find the reason. You might want to try memory read on the C&W.

SPACECRAFT Okay. Well everything's looking okay. We're proceeding on right to the burn.

CAPCOM Okay, Vance.

PAO Shuttle Mission Control at 1 day, 38 minutes and apparently just a stray signal to generate that mass master alarm. No indication anywhere in mission operations control room what might have prompted it, but CAPCOM instructed the crew to do a search, have it's computers do a search through the caution and warning memory in the general purpose computer to determine what generated that alarm. Circumstances appear favorable for the burn to the left OMS engine. Ignition 6 minutes away to satisfy the development test objective for a cold OMS engine restart. Mission elapsed time 1 day, 39 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, this Houston with you through Botswana for 5 minutes.

SPACECRAFT Okay, Bob. And we're all set up for the cold restart first burn of that A burn, 54 seconds to go.

CAPCOM Roger, Vance.

PAO Shuttle Mission Control. The burn 15 seconds away and it's roughly 5 minutes between the 2 burns. And this burn of course will occur in site of Botswana. We'll be in voice contact with the crew.

PAO Shuttle Mission Control. We're about 2 minutes away from the second burn. These, of course, over Botswana where we have only a UHF air to ground and no down link telemetry, so the control center here in Houston is unable to monitor the status of the burns and the Delta V associated with them.

CAPCOM Columbia, Houston. 30 second to LOS. Yarragadee's next at 01.

SPACECRAFT Okay, Bob. We got the first burn off well and we're 1 minute from the next.

CAPCOM Copy Vance.

PAO At loss of signal, we acquire again in 12 minutes through Yarragadee, Australia. Commander Vance Brand reporting a

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good OMS burn. Mission elapsed time 1 day, 49 minutes. This is Shuttle Mission Control.

PAO Shuttle Mission Control. We're moments away from acquisition of signal through Yarragadee and should have the crews assessment of its second burn of the left OMS engine after cold restart development test objective. We won't have a look at the new orbital parameters until we get telemetry from Hawaii, through Hawaii. We have voice only through Yarragadee and should have contact momentarily. At mission elapsed time 1 day, 1 hour, 1 minute.

CAPCOM Columbia, Houston with you through Yarragadee for 8 minutes.

SPACECRAFT Okay, we copy.

CAPCOM And you're 5 by.

END OF TAPE

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CAPCOM Houston with you through Iarragadee for 8 minutes.

SPACECRAFT We copy.

CAPCOM And you're 5 by.

CAPCOM Columbia, Houston.

SPACECRAFT Yeah.

CAPCOM Roger, do you have any more information to pass to us on your master alarm?

SPACECRAFT Negative. We just a master alarm, that's all we had, and it went out. There was no other messages on the board. Something must have just came in and out real fast. It might have been that cabin atmosphere that we're having yesterday. But the cabin press and everything look fine.

CAPCOM Okay.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT This is Bill, I was standing in the aft flight deck area, well floating, so to speak, when it happened. And it seemed like correlated with that, there was a very short, 1 second or so venting sound that sounded as though it came from the vicinity of the 1 trash bags here that are venting by the head here. Of course that's down the hatch and I guess anything down here would have sounded like it was from that vicinity. But that was simultaneous with the master alarm which only flashed momentarily and was gone.

CAPCOM Okay, and did you do a memory read?

SPACECRAFT That's how we discovered what it was, and the cabin atmosphere was about the only thing that it looked like it could have been.

CAPCOM And Bill, did ya'll copy a number on panel R13?

SPACECRAFT No, say again. What about R13?

CAPCOM Did you copy a parameter number on that memory read?

SPACECRAFT I'm sorry, we did the front cockpit read. Let me go read it on R13.

CAPCOM Okay, and I'll pick it up from you over Hawaii, we

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got about 7 seconds LOS, and we'll see you over Hawaii about 2 6.

SPACECRAFT Okay.

CAPCOM Columbia, Houston with you through Hawaii for 8 minutes.

SPACECRAFT Okay. I've got a question for you.

CAPCOM Okay, go ahead.

SPACECRAFT CAP's not to clear, when do you want us to start that maneuver for the rotation for the S-band UHF antenna test pattern?

CAPCOM Okay, standby a second, we'll check it.

SPACECRAFT Okay, while you're checking that, the caution and warning parameter that I looked up is parameter 1 4, fourteen is 0261 flow.

CAPCOM Okay, that's what we expected here, and we'll get back to you on it.

SPACECRAFT Okay, as soon as I saw that, that kind of made a lot of sense.

CAPCOM Roger.

CAPCOM Columbia, Houston, in answer to your question, we'd like for you to be rotating just before Mila AOS. AOS is scheduled for zero 1 hours and 46 minutes and 56 seconds.

SPACECRAFT Okay, it's 1:46:56 we must start, the 20 slightly before that, is that right, adam 20?

CAPCOM That's affirmative.

CAPCOM Columbia, Houston.

SPACECRAFT Alright.

CAPCOM Roger, in order for this S-band UHF antenna pattern to work, we will need for you to start that test from the minus ZLV attitude. So you'll have to go back to that attitude now to get set up.

SPACECRAFT Okay. And can you show me in the CAP where that minus ZLV stowage (garble)

CAPCOM Okay, it's bottom of page 4-20.

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SPACECRAFT Okay, well we should be tracking on that maneuver that we were before, and got everything set up ready for the go to the rotate as soon as we get over the states at the end of this pass, your call.

CAPCOM Okay, Columbia, we'd like for you to start rotation just prior to Mila, oh about 30 seconds before like we talked about before. And Bob, if you could, remember when you...

END OF TAPE

CAPCOM Okay, Columbia. We'd like for you to start the rotation just prior to Mila about 30 seconds before like we talked about before. And Bob, if you could remember when you went out of the ZLV attitude, we'd like to know.

SPACECRAFT Okay. That must have just been happening about a minute before we came up on after we left you at Botswana. Did an Item 19 a second time and that started the maneuver wrong there.

CAPCOM Okay. So you did not go back to the ZLV?

SPACECRAFT After the OMS burn, we went through the maneuver as specified on 1-20 at the bottom there.

CAPCOM Okay.

SPACECRAFT We were in that maneuver and when I was loading the present body vector set up for the rotation, I mistakenly (garble).

PAO Had loss of signal through Hawaii. Will reacquire again in about a minute and 1/2 through the Buckhorn station. The S-band uhf antenna check is being performed over those stations in Hawaii in order to better understand the pattern and the radiation qualities of those communications media when the Orbiter is in a variety of different attitudes, and the discussion about the length of time that the Orbiter has been in the nose sun, or nose down attitude is in response to some concerns by the payload's officer. Having to do with the thermal conditions of the ANIK spacecraft in the payload bay, assuring that it isn't overheated by sun radiation while it's in that nose sun attitude. We'll have voice contact again momentarily. Mission Elapsed Time, 1 day, 1 hour, 36 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, Houston, we've got you again through Buckhorn for 8 minutes and I missed the last part of your conversation on going back to ZLV Bob. I copied that you did initiate maneuver and that then you started setting up for the S-band tests, and then we lost you.

SPACECRAFT (garble) In setting up for S-band test, I did the Item 14, mistakenly did an Item 19 which I didn't appreciate it, but that Item 19 I believe took us out of the 0 to vertical.

CAPCOM Okay. Fine. So that would have been shortly after finishing the burns up there at Botswana, so just a few minutes after that is when all this happened.

SPACECRAFT That's affirm. We did get that maneuver started exactly as scheduled on 1-20 right after the burn, but in setting

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up for this maneuver about now, let's say about 1:10, so we're setting up for that Item 19 with the wrong body vector in there.

CAPCOM Okay Bob. Well, thanks a lot. Sorry to bother you on it, but we just needed to document how much time we've been out of attitude.

SPACECRAFT It couldn't have been more than 2 or 3 minutes at the most.

CAPCOM Okay.

SPACECRAFT That was all the night pass there, so it didn't hurt hour PAMs I don't think.

CAPCOM Okay.

PAO Shuttle Mission Control. Overmyer stating that the vehicle was in darkness all the time it was out of attitude and, therefore, alleviating any concern that the ANIK payload may have not received some undesirable heating during that period. Still in voice contact in the pass across the Continental United States. We'll have a voice contact for another 6 minutes. This is Shuttle Mission Control at 1 day, 1 hour, 39 minutes.

CAPCOM Columbia, Houston. A request GNC spec 1 for variable parameters.

SPACECRAFT Okay. You got it.

CAPCOM Thank you.

CAPCOM Columbia, Houston. You can have the CRT back.

END OF TAPE

SPACECRAFT Okay, you got it.

CAPCOM Thank you.

CAPCOM Columbia, Houston. You can have the CRT back.

SPACECRAFT Okay, Ernie and we're about ready to start that rotation and we're going to have to go move some antenna switches here. Is that okay?

CAPCOM Okay, I show it about 43 now. The Mila AOS will be about 47.

SPACECRAFT Okay, you want us rotating by the time we get there though, right?

CAPCOM Affirmative.

SPACECRAFT Okay, we're going to take the S-band antennas upper left and FM antennas upper, right now and we're going to start the rotation.

CAPCOM Okay. You're go.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT Just make sure we got our timing together. How would it be if we start that 2 3 seconds maneuver at 1:46:20 today.

CAPCOM Stand by.

CAPCOM Columbia, Houston. You can start it right now.

SPACECRAFT Okay.

SPACECRAFT You couldn't tell we're maneuvering.

CAPCOM Okay.

SPACECRAFT The S-band antenna is lower left and the FM antenna is in upper and we will, (garble) kind of panel command or are you going to handle that.

CAPCOM That's all we need you to do right now.

SPACECRAFT Houston, Columbia. Out of curiosity, how are you reading us?

CAPCOM Columbia, Houston. Say again.

SPACECRAFT Just wondered how you're reading us while we're doing this roll.

CAPCOM Okay, we read you 5 by right now. We may be going through a keyhole here in about 10 seconds.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. We're out of the keyhole and we have you through Mila for another 6 1/2 minutes.

SPACECRAFT Okay, really an interesting affect up here. A little bit like a slow roll on a KC 135 if anybody's ever done that.

CAPCOM Sounds like fun. If you like that sort of thing.

SPACECRAFT I don't know anybody that would.

CAPCOM Well, some people like a whole handfull of throttles and stuff like that.

SPACECRAFT Right.

SPACECRAFT Roy, it's kind of interesting from here. You can see jetties (garble) across the coast by just looking at the contrails.

CAPCOM Copy.

SPACECRAFT Tell everybody at the Cape to smile, we're taking their picture.

CAPCOM Okay, Bill. They're probably listening to us down there.

SPACECRAFT And receive at Cape, Roy.

CAPCOM Okay. And I guess they're reporting a front in the vicinity of the Cape. Apparently the weather looks pretty good to you though right now.

SPACECRAFT Yes, it looks like it would be good for launching today, too.

CAPCOM Wish we had another one ready to go.

SPACECRAFT There are clouds scattered across Florida, though.

CAPCOM Okay.

CAPCOM Columbia, Houston. We're complete with the S-band

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antenna test and you're clear to go to your next attitude which would be the amulan attitude.

SPACECRAFT Okay, we're stopping this one.

CAPCOM Columbia, Houston, we're 30 seconds LOS. We'll see you at Ascension at 04. And a reminder, S-band antennas back to GPC.

SPACECRAFT Okay, in work. We...

PAO This is Shuttle Mission Control. Mission elapsed time 1 day, 1 hour, 57 minutes. Columbia on its nineteenth orbit of the earth. Will acquire signal again in about 7 minutes through Ascension Island. The 2 OMS burns occurred out of site of any ground tracking station, although we had voice contact through Botswana and subsequently through Yarragadee.

END OF TAPE

PAO This is Shuttle Mission Control. Mission Elapsed Time, 1 day, 1 hour, 57 minutes. Columbia on its 19th orbit of the Earth. Will acquire signal again in about 7 minutes through Ascension Island. The 2 OMS burns occurred out of sight of any ground tracking station, although we had voice contact through Botswana and subsequently thorough Yarragadee. Tracking occurred over Hawaii and over the Continental United States and based on a product of that tracking, projected new orbital parameters, following those OMS burns are an apogee of 160.8 nautical miles and a perigee of 159.1 nautical miles. Shuttle Mission Control. We're about 30 seconds away from acquisition of signal again. Mission Elapsed Time, 1 day, 2 hours, 4 minutes. Orbital parameter is now computed at apogee of 161.1 nautical miles, perigee 160.4 nautical miles. Velocity is 25,367 feet per second. 25,367 feet per second velocity.

SPACECRAFT Okay Houston. Loud and clear.

CAPCOM Roger, and you're 5 by.

CAPCOM Columbia, Houston. I have a small note for you on the COAS cal.

SPACECRAFT Okay. We're ready to copy.

CAPCOM Roger. Nothing to copy really. Just a reminder to check dap and pulse mode for the COAS and also I'd like to pass on the FIDO reports you're in a 160.5 by 160.2 orbit.

SPACECRAFT Okay. Sounds pretty close to 160. (garble)

CAPCOM Affirmative.

SPACECRAFT Just a note, we did get out of pulse with the alignment yesterday, but it was more out of desperation than anything else.

CAPCOM Okay. Understand Vance.

SPACECRAFT Or, exasperation is a better word for it.

CAPCOM Well, we hope it goes a little better today and we sent some notes up for you in the mission summary regarding how much effort that's spent on it though.

SPACECRAFT Okay.

SPACECRAFT Roy, how do you copy, Joe?

CAPCOM You're loud and clear Joe.

SPACECRAFT Okay. Very good. During the S-band antenna tests, we got some rather interesting TV I think which we will be happy to dump down to you if there's an opportunity between now and when we get tied up with an ANIK deploy. I've leave it up to you as to whether you have a time available or not.

CAPCOM Okay. I'll check it right quick and get back to you.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. Joe, the next opportunity would be at the beginning of your meal on the next Hawaii pass if that's okay with you.

SPACECRAFT All right Roy. I think that's fine. Be with you in a second.

SPACECRAFT And Roy, has a question.

CAPCOM Go ahead.

SPACECRAFT Roger. What page can I find the procedure for star track threshold (garble) DTO 774 in the orbit ops checklist?

CAPCOM Standby.

CAPCOM Columbia, Houston. Vance, the only words on that DTO are printed in the cap on page 422.

SPACECRAFT Okay. I remember now. Thank you very much. (garble).

CAPCOM Roger.

END OF TAPE

CAPCOM Columbia, Houston. Vance, the only words on that DTO were printed in the cap on page 422.

SPACECRAFT Okay, I remember now. Thank you very much.

CAPCOM Roger.

SPACECRAFT Ernie.

CAPCOM Go ahead.

SPACECRAFT The dump during the start of meal pass will be no problem at all. We'll go ahead and do that.

CAPCOM Okay, we'll set up for Hawaii and the AOS for that will be 3 hours and about 3 minutes.

SPACECRAFT Copy, 3:03.

CAPCOM Roger.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT Okay, we're torquing on the align. Just completed it. I don't know if you saw anything, but we torqued at 1 day, 2 hours, 12 minutes, 25 seconds.

CAPCOM Okay, Vance and we copied all the numbers and about 15 seconds LOS. We'll see you at Botswana at 16.

SPACECRAFT Okay, very good.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT Okay, on the star track threshold verification.

CAPCOM We'll probably going LOS Vance. I'll talk to you at Botswana.

SPACECRAFT (garble)

CAPCOM Columbia, Houston. With you through Botswana for 8 minutes.

SPACECRAFT Roger.

CAPCOM And Vance, we went LOS before we could hear your question on the star tracker test if you want to repeat it.

SPACECRAFT Okay, my only question was does whether we're in daylight or darkness have any bearing on our sensitivity test. For example, it might be easier to (garble) picking something up in darkness.

CAPCOM Okay, Vance. Stand by just a second. I'll let you know.

CAPCOM Columbia, Houston. Vance, we don't think that will have any affect because of where the stars are.

SPACECRAFT Okay, fine.

SPACECRAFT Houston, Columbia.

CAPCOM Roger, go ahead.

SPACECRAFT Okay, the threshold verification is complete and do run good. So you can see it on your data and the test started at 14 minutes and 30 seconds MET this hour.

CAPCOM Okay, good.

CAPCOM Columbia, Houston. 1 minute LOS via Yarragadee at 38.

SPACECRAFT Roger. And be advised threshold was 2 for minus Z star and 0 for minus Y.

CAPCOM Okay, copy 2 for minus Z and 0 for minus Y.

PAO This is Mission Control, Houston at 1 day, 2 hours, 25 minutes. Inertial measurement unit alignment has occurred on board the vehicle and Mission Commander Vance Brand was discussing that activity with the CAPCOM in that pass over Botswana. Flight Director John Cox in the orbit team of flight controllers are tagging up in the Mission Control Center now with the ascent entry team members in preparation for that handover. Acquire signal again in 11 minutes through Yarragadee at 1 day, 2 hours, 26 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, this is Houston with you through Yarragadee for 5 minutes. Standing by.

SPACECRAFT Okay, Houston. You came in broken. We're in the middle of the COAS cal right now.

CAPCOM Okay Vance. We copy that and we have no traffic for you this pass.

SPACECRAFT Okay, thanks.

CAPCOM Columbia, this is Houston with you through Yarragadee for 5 minutes, stand by.

SPACECRAFT Okay Houston, you came in broken, we're in the middle of the COAS cal right now.

CAPCOM Okay, Vance, we copy that, and we have no traffic for you this pass.

SPACECRAFT Okay, thanks.

SPACECRAFT (garble)

CAPCOM Columbia, this is Houston, 20 seconds to LOS. Guam is next at 02:50.

SPACECRAFT Okay, see you there.

PAO This is Mission Control, Houston, LOS through Yarragadee. Little more than an exchange at the beginning and end of that pass between the spacecraft communicator and the crew. 5 minutes away from acquisition through Guam. At the outset of orbit 19, at equatorial crossing. 1 day, 2 hours, 44 minutes, elapsed time, Mission Control, Houston.

CAPCOM Columbia, Houston, with you through Guam for 6 minutes.

SPACECRAFT Okay, Houston.

SPACECRAFT Houston, this is Columbia, do you read?

CAPCOM Yeah, Columbia, got you loud and clear, go ahead, Joe.

SPACECRAFT Okay, I'm watching Bob and Vance to this calibration, and looking out the back window, we're looking down on (garble) of lightning displays, the land mass we're going over. And a note for Owen as Bob moves the vehicle to position a COAS, we get little bursts of light from the vernier jets. And just after they fired there's a very definite glow on the upstream side of the verticle stabilizer and that lasts for a few seconds, then dies off gradually.

CAPCOM Okay, Joe, we copy that. Is there any chance you might get a photograph of it later on?

SPACECRAFT We're trying to, Bob. It's visible with the naked eye, and not all that well adapted. It is more pronounced on the upstream side, as they say, than downstream. I'm not sure I can even see it on the downstream side, but is very definitely there

and it follows thruster firing. And Bob I go a few words for you about this align.

CAPCOM Okay, go ahead.

SPACECRAFT Star peacock was very very dim all the way through that night pass for me. There were other stars that were brighter, I wish we had one of those, the peacock was just very very dim, and the radical, between the radical peacock being dim, the radical being (garble) low enough and this window being so hazy still, I was able to get a very good. We got one was .37, I didn't like that one, I was a little closer on it. The next time it was .45, so we accepted that, but those are just as close as we can get the right now, and then the star is set at this time.

CAPCOM Okay, Bob, we copy that.

CAPCOM Columbia, this is Houston, we're 40 seconds to LOS at Guam, Hawaii will be next at 3 0 2. We're going to have to do a couple of commands to configure this sight, prior to your TV dump, we're really looking forward to it.

SPACECRAFT Okay, you bet ya.

PAO Mission Control, Houston, LOS Guam. During the Guam pass, Joe Allen came on to mention that, looking aft out of the flight deck rear windows, he could see a glow from the vernier jets after they fired for a few seconds, after each firing, on the upstream side of the vertical fin, and he might attempt to photograph this phenomenon.

END OF TAPE

PAO the windows, you could see a glow from the vernier jets after they fired for a few seconds after each firing, on the upstream side of the vertical fin, and he might attempt to photograph this phenomenon. An unscheduled television dump coming up here at Hawaii, the antenna test, we're 6 minutes away from acquisition at Hawaii, and we'll be back at that time. 1 day, 2 hours, 56 minutes, Mission Control, Houston.

CAPCOM Columbia, this is Houston with you through Hawaii for 8 minutes.

CAPCOM Columbia, this is Houston through Hawaii for 8 minutes.

SPACECRAFT Roger, Bob, I'm going to start the VTR now.

CAPCOM Hold off a second, Joe, let us give you a call on that while the sight's being reconfigured. In the meantime, if you could give me a GNC spec 1 on one of the CRT's.

CAPCOM Okay, Joe, sight's configured,

SPACECRAFT Roger, on the way.

CAPCOM Okay, and sight's configured, you can start the dump.

SPACECRAFT We're having a hard time getting Bill back to work. He'll get back shortly, and we'll show you the view out the, the rear window here, as we do the S-band test.

CAPCOM Joe, does this have anything to do with Bill's grasping things with his feet yesterday?

SPACECRAFT Say it again, Bob.

CAPCOM Does this peanut feeding exercise have anything to do with the way he was using his feet yesterday?

SPACECRAFT Right, that's his reward for the successful deploy yesterday.

Music

SPACECRAFT Can you still feel Robert?

CAPCOM Say again, Joe.

SPACECRAFT Are you still getting TV.

CAPCOM Sure are, looks real nice.

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CAPCOM Tucker Pierce says that what you are doing is like a snap roll in 135.

SPACECRAFT Wait till he puts in the rudder, you're not going to believe it.

SPACECRAFT At the end of the maneuver it seemed like we were headed about 60 degrees up, in a climb upside down. A very weird feeling, it feels like being in an airplane up there when you do that.

END OF TAPE

SPACECRAFT At the end of the maneuver it seemed like we were headed about 60 degrees up in a climb upside down, and a very weird feeling. It feels like being in an airplane up there when you do that.

CAPCOM Columbia, the variable parameters are on board. The CRT's yours again.

SPACECRAFT Thank you.

SPACECRAFT Houston, are you still with us?

CAPCOM Yes, Joe, we're still here.

SPACECRAFT Still getting the TV?

CAPCOM Yes sir.

SPACECRAFT We're going, we just passed across Florida now and we're looking down in the Caribbean. You can see a lot of the islands I hope including we think Jamaica, Cuba and others.

CAPCOM That's a firm. I think we're seeing some of the shallows out by Grand Banks. We're not quite sure. We are 30 seconds to LOS.

SPACECRAFT Roger, that.

CAPCOM Okay, Columbia. TV's gone. Thanks much for the show.

SPACECRAFT There's miles more, Bob. We'll bring it all home shortly.

CAPCOM Great.

PAO Mission Control, Houston. Loss of signal in Hawaii. A minute and 10 seconds from reacquisition through Buckhorn in California. Television dump there from the previous orbit over Florida, Cuba, Bahamas on orbit 18 during which time the spacecraft was doing S-band antenna test calling for fairly rapid roll motions to the spacecraft which provided some fairly spectacular television out the rear flight deck window of the tail group and the earth below and the changing shadows of rotating spacecraft. But the head of that TV pass had a small sequence of Bill Lenoir catching peanuts in his mouth being tossed by a crew man out of sight. Should be an acquisition here in about 10 seconds at Buckhorn. Mission Control, Houston, standing by.

CAPCOM Columbia, Houston. The orbit team's with you through the states for 8 minutes.

SPACECRAFT Okay. Good to have you on board for the second day of the mission.

CAPCOM And we're looking forward to a good rerun of yesterday.

SPACECRAFT Right. We agree.

PAO Mission Control, Houston. The crew apparently following the old business of not talking while eating at the current time during the state-side pass. The change-of-shift briefing with outgoing Flight Director Tommy Holloway should begin at 9:50 central time in the main JSC newsroom.

CAPCOM Columbia, Houston. 30 seconds to LOS. We'll see you at Ascension at 3 + 42.

SPACECRAFT Okay. Roger, we copy Brian. We'll see you.

PAO This is Mission Control, Houston. LOS through Merritt Island launch area station. Very quiet state-side pass as the crew is in the midst of a meal period. Next station in 14 minutes, Ascension Island midway through orbit number 19. New, slightly modified deploy time for the ANIK spacecraft. Slightly earlier than called for in the initial flight plan. It's day 2, 8 hours, 5 minutes, 12 minutes as opposed to about 7 minutes after the eighth hour. At any rate, the crew will shortly begin preparations for deploying the ANIK satellite later on today.

END OF TAPE

PAO ... as opposed to about 7 minutes after the eighth hour. At any rate the crew will shortly begin preparations for deploying the ANIK satellite later on today. This is Mission Control at day 1, 3 hours, 29 minutes.

CAPCOM Columbia, Houston with you at Ascension for 5 and 1/2.

SPACECRAFT Roger, Brian.

CAPCOM Columbia, Houston. We're 30 seconds to LOS. We'll see you at Botswana at 3 plus 52.

SPACECRAFT Roger, Brian.

PAO Mission Control, Houston. 30 seconds from acquisition through Botswana voice relay station. Midway through Orbit 19.

CAPCOM Columbia, Houston. With you at Botswana for 7 and 1/2 minutes.

SPACECRAFT Roger, Brian. We got you.

CAPCOM Columbia, Houston. 30 seconds till LOS. We'll see you at Guam at 4 plus 24.

PAO Mission Control, Houston. LOS at Botswana. 23 minutes across the Indian Ocean to next station which appears to be Guam on the end of Orbit 20. Crew should be stacking the dishes from their meal period at this time and preparing for some of the onboard activities including preparation for deploying the ANIK satellite later today. At 1 day, 4 hours, 1 minute. Mission Control, Houston.

PAO Mission Control, Houston. 30 seconds away from acquisition of Columbia beginning its 20th earth orbit. Coming up on Guam where a routine private medical conversation with the Flight Surgeon is scheduled. Likely part of that pass will be handed back to CAPCOM. Columbia is now at an orbit of 161.3 nautical miles of apogee, 160.4 perigee. Period of orbit - 1 hour, 30 minutes, 38 seconds .5.

CAPCOM Columbia, Houston's with you with 40 seconds to go in this pass.

SPACECRAFT Okay, not much time left.

CAPCOM Roger, and we'll see you over Hawaii at 4 plus 38.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

CAPCOM Go ahead, Columbia.

SPACECRAFT Roger. I know you probably don't have it all figured out yet, but if you have any interim word on what you're thinking about on the CRT 2 problem, I'd be interested.

CAPCOM Okay. We'll talk to you about that over Hawaii with our latest.

CAPCOM Columbia, Houston. With you at Hawaii for 7 minutes.

SPACECRAFT Roger, Ron.

CAPCOM And, Vance, to answer the question you had last pass about CRT, we're considering right now that we'll do a DEU cable swap out on Day 5 and if no joy there, then we'll follow that up with a DEU change out itself.

SPACECRAFT Okay. Real good. We were thinking in terms of Day 5 being a ISM Day two. You say you're looking at a DEU and not a CRT swap up?

CAPCOM That's affirmative. That's what it looks like to us.

END OF TAPE

SPACECRAFT Okay, real good. We were thinking in terms of Day 5 being a good IFM day too. You say you're looking at a DEU and not a CRT swap up?

CAPCOM That's affirmative. That's what it looks like to us.

SPACECRAFT You may have the experts to know, but boy I'll tell from the picture onboard it just looks like a shift in the CRT tube itself.

CAPCOM Roger, but IBM OEGO tells us that that is one of the failure modes of the DEU also, so the cable swap up will help us with that.

SPACECRAFT Looks like Bob can do his homework next couple of days on what all that entails. Thanks for the word there.

CAPCOM Roger, that.

SPACECRAFT We don't copy it.

CAPCOM And Columbia, Houston. One more word for Bob on the IFM. We're looking at a few changes to the procedure that's in the checklist for the IFM DEU changeout and, once we've sorted those out, we'll send them up by teleprinter.

SPACECRAFT Okay, Brian.

CAPCOM Columbia, Houston. 30 seconds to LOS. We'll see you over the states in 2 minutes.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. With you over Buckhorn and the states for 6 minutes.

SPACECRAFT Roger. Loud and clear Brian.

CAPCOM Columbia, Houston. 30 seconds left in this pass after a long LOS. We'll see you in Botswana 5 plus 28.

SPACECRAFT Okay Brian. We copy that.

PAO This is Mission Control, Houston on a loss of signal through Buckhorn, 33 minutes away from voice relay station at Botswana at which time we shall return. Coming up on the midpoint of orbit number 20 and some 3 hours and 9 minutes away from deploying the second commercial satellite, the ANIK Canadian satellite scheduled for deployment during orbit number 22 as Columbia crosses the equator on the descending node. Mission Control, Houston out at 4 hours, 55 minutes, Day 1.

PAO Mission Control, Houston. 25 seconds away now from acquisition through the voice tracking station at Botswana. Should have contact any moment now and shortly the crew will begin their activities toward deploying the ANIK satellite later today after some exercise in housekeeping onboard Columbia.

CAPCOM Columbia, Houston with you at Botswana for 7 minutes.

SPACECRAFT Roger, Houston. Loud and clear.

CAPCOM Columbia, Houston. 20 seconds till LOS. We'll see you at LOS in 2 minutes at 5 plus 40.

SPACECRAFT Okay. See you there.

CAPCOM Columbia, Houston with you over Indian Ocean for 3 minutes.

SPACECRAFT Roger, Houston copy.

CAPCOM Columbia, Houston. 20 seconds to go to LOS. We'll see you at Guam at 6 plus 01 and we expect to have targets and timbus ready to go up and deploy and SEP pads at that time.

SPACECRAFT Okay, Brian.

PAO Mission Control, Houston. LOS through Indian Ocean station. 17 minutes away from reacquisition through tracking station at Guam. Beginning of orbit number 21 for Columbia. The following orbit will be the deploy orbit for ANIK satellite some 2 hours and 20 minutes from now. In the upcoming Guam pass, the crew will be read the numbers to go into the prepared tables on board for both the deployment of the satellite and for the subsequent separation burn which, again, will put Columbia some 18 nautical miles above and behind the ANIK satellite while it does its perigee...

END OF TAPE

PAO minutes away from reacquisition through tracking station at Guam. Beginning of orbit number 21. The following orbit will be the deploy orbit for ANIK satellite, some 2 hours and 20 minutes from now. In the upcoming Guam pass, the crew will be read the numbers to go into the prepared tables onboard for both the deployment of the satellite, and for the subsequent separation burn, which again will put Columbia some 18 nautical miles above and behind the ANIK satellite, while it does its perigee kick motor burn. At day 1, 5 hours, 44 minutes, Mission Control, Houston.

PAO This is Mission Control, Houston, 40 seconds away from acquisition of Columbia through the tracking station, western Pacific on Guam. Beginning of orbit 22, some 2 hours and 4 minutes away from deploying ANIK satellite on the next orbit. We now have acquisition, the numbers, so called pad updates for ANIK deploy and for separation maneuver will be read up at this pass.

CAPCOM Columbia, Houston with you for 6 and a half minutes over Guam.

SPACECRAFT Okay, Houston, we're here, all ready to take your info on the pad.

CAPCOM Roger, Columbia, standby for a deploy pad, ANIK deploy pad follows. Deploy times, 001/08:05:11, 316/20:24:11, item 17, +27375851, deploy attitude 023.07, 078.17, 29er0.36, readback.

SPACECRAFT Okay, Brian, standby. Rereadback follows, 001/08:05 11, 316/20 24 11, 27375851, 023.07, 078.17, 29er0.36, over.

CAPCOM Roger, Joe, that's a good readback, SEP pad follows.

SPACECRAFT Go ahead.

CAPCOM Roger, OMS both, DB roll 180, trimload -0.3, -5.7, +5.7, wright 215547, TIG 1/08:20:11.0, TIG 7, +0015.4, plus all balls, -004.4, burn attitude, 024, 027, 344, delta V total, 0016.0, T-GO, 00:09, V-GO, +0015.39, plus all balls, +004.44, targets 169 by 161, readback.

SPACECRAFT Okay, Brian, OMS both, TV roll, 180, -0.3, -5.7, +5.7, 215547, 1 08 20 11 0, delta Vx +0015.4, all balls, -004.4, burn at, 024, 027, 344, delta V total, 0016.0, 00:09, +0015.3

END OF TAPE

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SPACECRAFT delta V total 0016, 00:09er, +001539er plus all balls +004.44, 169er by 161, over.

CAPCOM Roger, Bob, that's a good readback.

CAPCOM And Columbia, Houston, the TMBU and the targets are up.

SPACECRAFT Okay, copy, thank you.

CAPCOM Roger, and when you got a chance we'd like you to clear the star table. That'll allow us to watch the alignment through the deploy.

SPACECRAFT Thurst.

SPACECRAFT And Brian, I have a question for you.

CAPCOM Go ahead.

CAPCOM Roger, Columbia, go ahead.

SPACECRAFT Brian, under the commander's column 4-26, where it represents an interconnect return, our understanding this morning was we were going to go through all the interconnects and everything this, or all the burns and everything with it interconnected as you've got it right now, right OMS to RCS. Is that affirm?

CAPCOM Standby.

CAPCOM And Columbia, Houston, on your interconnect return, we'd like you to go to do the procedure, interconnect return as spelled out in the CAP. The other note that you had this morning was only for the recirc burns.

SPACECRAFT So, right now you want us to take it off interconnect, is that right?

CAPCOM That's affirmative.

SPACECRAFT (garble) thank you.

CAPCOM Columbia, Houston, 25 seconds to go till LOS, and at Hawaii, I'd like to read up a note to Joe and Bill on the PAM index selonoid extender inhibit command data.

SPACECRAFT Okay, Brian, we'll be standby for that.

CAPCOM Roger, and see you at Hawaii.

PAO Mission Control, Houston, loss of signal at Guam, 6 minutes away from reacquisition at Hawaii. Out of all that flood of numbers read back and forth, were the times of ANIK deploy, and the separation burn. Deployment time for the ANIK satellite is 8 hours, 5 minutes, 11 seconds. Where the 2 engine OMS separation burn, 15 minutes later at 8:20:11. It'll be a 15.4 foot per second posigrade burn, yielding a change in orbit 161 by 169 in which the Columbia will be in somewhat's higher orbit and gradually fall behind the satellite so that at the time of perigee kick motor ignition there will be a separation of some 18 nautical miles. 5 minutes until reacquisition through Hawaii, and standing by, Mission Control, Houston.

CAPCOM Columbia, Houston, with you over Hawaii for 7 and a half minutes.

SPACECRAFT Roger.

CAPCOM And Columbia, if you've got a minute, I've got a couple of addresses and some information for you to watch the index selonoid extend inhibits commands on your spec zero.

SPACECRAFT Go ahead, Brian.

CAPCOM Okay, Joe, the 2 addresses you need for the PAM ANIK indexer selonoid extension inhibit commands are item 28, +0 charlie 97 alpha, and item 30 +0 charlie 95 delta, readback.

SPACECRAFT Okay, that's item 28 +09 charlie 97 alpha, and item 30 +0 charlie 95 delta, over.

CAPCOM Joe, I didn't get a good readback on item 28, I'll repeat, that's 0 charlie 97 alpha.

SPACECRAFT Okay, Brian, that sounds better, I did miscopy. It's item 28, +0 charlie 97 alpha.

CAPCOM Roger, Joe, and in the hexaddresses in the actual column, for item 28, the first hex digit on the left

END OF TAPE

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SPACECRAFT Okay, Brian that sounds better, I did miscopy, it's item 28, +0 charlie 97 alpha.

CAPCOM Roger, Joe, and in the hex addresses in the actual column for item 28, the first hex digit on the left will go from 0 to 4 when the inhibit is commanded. And for the item 30 actual, the third hex digit from the left will go from 0 to 4 when inhibit is commanded.

SPACECRAFT Okay, understand the first hex digit will go from 0 to 4 when the inhibit is commanded. And the third hex digit from 0 to 4 when the inhibit is commanded on item 30.

CAPCOM That's affirmative.

SPACECRAFT Okay, hope we see that.

CAPCOM Roger.

SPACECRAFT And Brian, it's interesting to note that I did have the wrong address of yesterday, they were off by 1 by 1 hex indicator.

CAPCOM Roger, we copy that.

CAPCOM Columbia, Houston, we have put a new state vector onboard.

SPACECRAFT Okay, Brian, we copy, thank you.

CAPCOM Columbia, Houston, 30 seconds to LOS, we have a long LOS, we'll see you at Botswana at 7 + 04.

SPACECRAFT See you then, Brian, thank you.

PAO Mission Control, Houston. Loss of signal at Hawaii, this orbit misses the states all together, and consequently, there's a long loss of signal period until Botswana voice relay station in some 41 minutes. 6 hours, 22 minutes into the second day of STS-5, Mission Control, Houston.

CAPCOM Columbia, Houston, with you for 6 and a half minutes at Botswana.

CAPCOM Columbia, Houston, with you for 6 minutes at Botswana.

SPACECRAFT Okay, we got you. And Brian, here comes item 1, execute on spec 211 and we'll tell you how it works.

CAPCOM Okay, Joe.

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SPACECRAFT Houston, this is Columbia, are you still with us?

CAPCOM Roger, go ahead, Joe.

SPACECRAFT Okay, Brian, we're sitting here waiting to start page 5-8, we have completely clean report to give you so far. Everything looks very normal.

CAPCOM Roger, that's good news. And we have a 1 minute LOS coming up between Botswana and IOS.

SPACECRAFT Roger, that.

CAPCOM Columbia, Houston, with you over Indian Ocean for 8 and a half minutes.

SPACECRAFT Okay, Brian, you're loud and clear.

SPACECRAFT And Brian, restart the target bullet 202 lift all headers, and how about taking a look at our (garble) attitude (garble)

CAPCOM Roger, we're looking now.

CAPCOM Columbia, Houston, 1 minute till LOS, next will be Guam at 7 + 39. And to finish up the interconnect return, we need a item 7 on spec 23.

SPACECRAFT Thank you.

SPACECRAFT Okay, Brian, we copy that. And we'll see you shortly.

CAPCOM Roger.

PAO This is Mission Control, Houston, acquisition of Columbia through the tracking station at Guam. Coming up on the deploy operations in the Guam and following Hawaii pass should have live TV at Hawaii

CAPCOM for 3 minutes we'll have a minute right in the center of this pass of LOS in the keyhole.

SPACECRAFT Okay, Brian, we understand that. You're loud and clear now.

END OF TAPE

PAO ...this Hawaii pass should have live TV at Hawaii
CAPCOM for 3 minutes.. We'll have a minute right in the
center of this pass of LOS in the keyhole.

SPACECRAFT Okay Brian. We understand that. You're loud and
clear now.

CAPCOM Columbia, Houston. Twenty seconds to LOS. We'll
see you at Hawaii at 7 plus 50 and we're looking forward to your
TV at that time.

SPACECRAFT Okay Brian. We'll scramble to get it set up.

PAO This is Mission Control, Houston. Less than a
minute now from reacquisition of Columbia through the Hawaii
tracking station and live television from the spacecraft.
Fifteen minutes away from deploying the ANIK satellite as orbit
22 crosses the equator, southeast of Hawaii. Television
recordings, or video tape recordings will be played down on the
following Hawaii pass one orbit later. Should be getting
acquisition momentarily through Hawaii.

CAPCOM Columbia, Houston with you through Hawaii for 8
minutes.

SPACECRAFT Roger that Brian. We have an Item 5 plus 1, AFC 1
is enabled and the encoder is now on. We're ready to configure.

CAPCOM Roger Joe. We see that.

SPACECRAFT And Brian, camera Charley's got the spinning cap.

CAPCOM Roger. We see the TV. It looks good.

SPACECRAFT Okay Brian. We're 13 inutes away and we don't
have a single anomaly to report. It looks beautiful to us here.

CAPCOM Roger Joe. It looks good to us so far and we're
seeing pretty good TV from the interior now as well.

SPACECRAFT What can we say?

SPACECRAFT And Brian, well try to look out aft over the top of
the SBS sunshield. We can't see the sunshield from ANIK but you
can, every now and then, see the oblong side of the OMNI coming
over top of it.

CAPCOM Roger that Bill.

PAO Flight Director, John Cox, polling all the flight
controllers here in the MOCR.

SPACECRAFT Brian, those memory addressers work like a piece of cake. We hooked them up and they changed from all balls to the numbers that you indicated plus some other bits that also changed. I think they were probably the restraints.

CAPCOM Okay. That sounds good Bill. And, we caught that also on our data before LOS at Guam.

SPACECRAFT Brian, we don't have the map out right now. How close to the Islands are we ?

CAPCOM Roger, you should be right over.

SPACECRAFT Okay, we'll look. Real pretty hues yesterday. Yeah, tell Brian we're just a little bit south of the islands right now and (garble) stands out perfect and (garble) is coming in just clear as a bell. Beautiful scene.

CAPCOM Roger. Sounds good.

SPACECRAFT Standby for internal power. We can see a runway at Oahu right now.

CAPCOM Roger.

SPACECRAFT (garble) got a little cloud over it though. (garble) has it's usual, no clouds at all there Brian.

CAPCOM Roger that.

SPACECRAFT Oh, we're looking right down (garble) on the big island.

SPACECRAFT Oh Brian. Those islands look just like they do on the map.

CAPCOM Well, that's comforting to know Bob.

SPACECRAFT Somebody did some good work. Bob thinks it's a good simulation of an atlas. And Brian, you should show the spacecraft on internal power now.

CAPCOM Roger. We saw that.

END OF TAPE

SPACECRAFT Bob thinks it's a good simulation in atlas. And Brian, you should show the spacecraft on internal power now.

CAPCOM Roger, we saw that.

CAPCOM Columbia, Houston, 30 seconds till LOS, AOS at Santiago is 8 + 17 + 48 and everything is still go down here for deploy.

SPACECRAFT Brian, we copy that, thank you very much. We're looking forward to having a good one.

CAPCOM Roger, good luck.

PAO This is Mission Control, Houston. Loss of signal on orbit 22 as the spacecraft progressed toward the deployment of the ANIK satellite in some 6 minutes. Television picture from the spacecraft showed the ANIK spinning up at about 50 rpm, and we'll have confirmation on deploy at the Santiago station in some 18 minutes, the voice relay station. And on the next orbit, over Hawaii, some of the video tape recorded onboard will be dumped at that time, showing actual deployment. At 7 hours, 59 minutes, Mission Control, Houston.

PAO Mission Control, Houston, about 30 seconds away from acquisition at Santiago at which station we should get a confirmation of ANIK deploy, and we're some 2 minutes away from ignition on the separation burn.

CAPCOM Columbia, Houston, with you at Santiago and standing by for your deploy report.

SPACECRAFT Okay Houston, this is Columbia, we are 2 for 2, we deliver, and we're standing by for a burn. How long will you be with us, Brian?

CAPCOM Roger, we have 5 minutes, we'll see the burn.

SPACECRAFT Okay, look at it, then we'll give you the numbers, we're going to try to record this on film.

CAPCOM Okay, Joe.

SPACECRAFT Actually, Brian, we have enough time, I'll give you the numbers in the same order Bill did, as follows: negative 03, negative 10, negative 04, and they're all preceded by a decimal point. And the rates are .000, negative .001, negative .003, over.

CAPCOM Roger, copy, they sound real good.

SPACECRAFT And I'll give you the current in a few minutes.

CAPCOM Roger.

SPACECRAFT And Houston, we have a good sep burn here.

CAPCOM Roger, Vance, we see the good burn.

SPACECRAFT Brian, I've got the current attitude numbers for you, as follows: 23.30, 9er8, I'm sorry, that's 78.38, and 29er0.43, over.

CAPCOM Roger, understand and we copy, thank you.

SPACECRAFT And Houston, now we're starting on the primary's on the gimbal check, if you're watching.

CAPCOM Roger.

CAPCOM And, Columbia, Houston, 20 seconds to go till LOS, we'll see you at Botswana at 8 + 40.

SPACECRAFT Okay, see you there.

PAO This is Mission Control, Houston. Confirmation came at the Santiago station of ANIK deployment, 2 for 2, we deliver, said Joe Allen. And also during that pass, the OMS separation burn to get the Orbiter away from the perigee kick motor ignition, upcoming here in 15 minutes after deploy, was also a good burn. Next station will be Botswana in South Africa in 16 minutes. At 8 hours, 24 minutes, Mission Control, Houston.

END OF TAPE

PAO mission, upcoming here in 15 minutes after deploy, was also a good burn. Next station will be Botswana in South Africa in 16 minutes, at 8 hours 24 minutes, Mission Control, Houston.

CAPCOM Columbia, Houston with you at Botswana for a minute and a half.

CAPCOM Columbia, Houston with you at Botswana for a minute.

SPACECRAFT Okay, we got you.

SPACECRAFT Okay Brian, and we've got some tape of the deploy if you'd like us to play it back at an opportunity later?

CAPCOM Roger, if you can get it ready by Hawaii, we'd like to hear that.

SPACECRAFT If you listen, it's ready now, but we'll wait for Hawaii.

CAPCOM Roger, Hawaii looks best to us.

SPACECRAFT Meet you in Hawaii.

SPACECRAFT And Brian, what time is AOS Hawaii, and how long is the pass?

CAPCOM Roger, Hawaii is 6 minute pass at 9 + 26, and we've got 10 minute, or 10 seconds till LOS here, we'll see you at IOS at 8 + 48.

SPACECRAFT Okay babe, we'll see you.

PAO Mission Control, Houston, we have acquisition through Indian Ocean Station, for about the next 8 minutes.

CAPCOM Columbia, Houston with you over the Indian Ocean for 8 minutes.

SPACECRAFT Hello, Brian.

CAPCOM Roger, read you loud and clear, and I've got 2 or 3 notes for you if you're ready to copy?

SPACECRAFT Okay, Brian.

SPACECRAFT Go ahead, Brian, where are we supposed to put these notes.

SPACECRAFT Go ahead Brian.

CAPCOM Roger, there are a couple of notes for you. First of all, on the oxygen interaction experiment on the top of DFI, we're interested in how the capton strip retainer springs handled the flight so far. And so before you activate the experiment at about 10 hours, we'd like you to get a TV picture, as good a close up as you can of that experiment. We'd like to see whether any of the individual material strips work themselves loose. We do not need a dump or any live TV of this, this is strictly for postflight.

SPACECRAFT Okay Brian, we copy that, you say you're interested in retainer springs?

CAPCOM That's affirmative and if you can get some closeups with camera B or C of the material strips themselves, we're interested in whether or not any of them have worked loose and are flapping in the breeze, so to speak.

SPACECRAFT Okay, we understand that. What's the other note?

CAPCOM Okay, we're interested in whether you had a chance so far, to get any photographs as per page 3-7 of the photo TV checklist of the window debris on the front windows?

SPACECRAFT Brian, I've taken some, standard set across all 6 windows on the front, they're all at one triangle, I'll want to get a glancing sun angle, and try and get a few more.

CAPCOM Roger, that, Joe, and

SPACECRAFT Yet.

CAPCOM Okay, we kind of expected that from his training preflight.

SPACECRAFT I can't right yet, don't give up on me.

CAPCOM Roger, and last note is from our ECOM, we'd like you to dump tank C to

SPACECRAFT Say again, Brian.

CAPCOM Roger, you're water dump tonight, we'd like you to dump B to 50 percent.

SPACECRAFT Okay, 50 percent, 5 0.

SPACECRAFT Okay. 50 percent, 50.

CAPCOM That's affirmative. And a couple of notes for the panels on the right side. For Panel R1, in order to prevent the FSS line from freezing, we'd like you to shut off the A and B heaters for both the oxygen tank 3 and hydrogen tank 3.

SPACECRAFT Okay Brian. I just did that. Oxygen tank 3 heaters all went to off and hydrogen tank 3 heaters are off. Is that what you want?

CAPCOM That's affirmative. On Panel R1 cryo systems.

SPACECRAFT That's complete.

CAPCOM Roger, and to prevent master alarms the rest of the day and tonight, we'd like you to inhibit caution and warning channels 14 and 54 for nitrogen and oxygen flow on Panel R13.

SPACECRAFT Roger that. We copy. 14 and 54.

CAPCOM Roger Joe, and we will reenable those for entry.

SPACECRAFT Okay. Very good. And Brian, we've got a request to make of INCO. We'll be standing by at Hawaii. As soon as he has his television recording up, he should give us a call and we will start the dump immediately so that they're not get in the whatever keyhole he must be working with down there. I'd say we have at least 3 good minutes, maybe a little more.

CAPCOM Roger that.

SPACECRAFT Brian, if that's all of your things we have one.

CAPCOM Roger. I had one more general one. We're working up an R4D jet firing a little later for you and we'll get the details and a time for you.

SPACECRAFT Okay. We'll expect it and with our morning report, if you could give us a rough idea of how our consumables are going, we'd appreciate it.

CAPCOM Wilco.

CAPCOM And Vance, no concern on consumables. Prop and ecom consumables look good right now.

SPACECRAFT Okay. Thank you.

SPACECRAFT Brian, this is Joe again. If you have no other urgent notes, I have a footnote item to give you if you are ready for that.

CAPCOM Roger Joe. Ready to copy.

SPACECRAFT Okay. In regards to the sponge growth experiment, belongs to Aaron Gillette from Winterhaven, Florida, due to an oversight on my part, I started it a little bit late and the time got away from me and I didn't stop it as he called for but I think we can salvage the protocol that he wants to follow. Let me just describe what I have done. I have started run number 2 at 1 day, 4 hours, 29 minutes and I finished at 1 day, 5 hours, and 29 minutes. I started run 1 at 1 day, 0 hours, 29 minutes and will stop that 24 hours later. However, I'd like a reminder perhaps on the teleprinter or something to me to stop it at that time. Run number 3 was started also at 4 hours and 29 minutes, that's 1 day, 4 hours, and 29 minutes and I found only 2 sets of packages for run number 3. If there should have been 3, then perhaps one of them is floating around loose here and we'll discover it later. I'd be interested in a report on that when you have time tomorrow.

CAPCOM Roger Joe. We'll get you a reminder on the teleprinter for that and we'll take a look at this number 3 pack for you.

SPACECRAFT Okay, and the reason I go into such detail, if there was a difference between the samples in the sets 1, 2, and 3, it may be that you will want to revise the time tables as to when I start and stop the next run.

CAPCOM Roger. Copy and we have 10 seconds to LOS. We'll see you at Guam at 9:17.

SPACECRAFT Okay. We'll see you there. Thank you.

END OF TAPE

PAO This is Mission Control, Houston, the tracking station at Guam has just acquired the ANIK spacecraft on time for a successful burn, perigee kick motor burn, and the separation of the perigee kick motor from the satellite has been confirmed.

PAO This is Mission Control, Houston, Columbia is now in acquisition at the Guam station.

CAPCOM Houston, Columbia with you over Guam for a minute and a half.

SPACECRAFT Roger.

CAPCOM And I've got a note for you on the R4D hot fire.

SPACECRAFT Go ahead.

CAPCOM Roger, as soon as you can we'd like you to do the R4D hot fire and give us the TIG so we can do our computations of temperature down here before you go to sleep tonight. Procedure will be to configure the DAP rotation excel, excel, excel, DAP A manual normal, low Z, and then using the forward RHC, give us a 2 second left roll to fire the R4D jet. Soon as possible after that, in order to avoid being out of attitude, like you to return to the normal DAP configuration, and then when in attitude, back to vernier control.

SPACECRAFT Okay Brian, I understand you want the R4D hot fires to be following slick DAP, rotation excel, excel, excel, A manual normal, low Z, and using the RHC, use 2 second left roll, and that'll fire the R4D, and then immediately give it back A auto and then give it back to vernier till they settle out.

CAPCOM That's a good readback, Bob.

CAPCOM And Columbia, Houston, words from the ANIK folks, the ANIK spacecraft has been acquired over Guam, right where they expected to see it. They hope to be getting spacecraft data in the next hour. And the position of the spacecraft implies the nominal PKM and spacecraft separation.

SPACECRAFT Outstanding, very good news.

SPACECRAFT That's great, and I'll be anxious to hear more. Before we lose you, I understand we can start that hot fire anytime, right?

CAPCOM That's affirmative.

SPACECRAFT Brian, to quote that famous Joe Allen, we haul, and we deliver.

CAPCOM Roger, that.

CAPCOM Columbia, Houston, 30 seconds till LOS, we'll see you at Hawaii at 9 + 26, and we're looking forward to your VTR dump at that time.

SPACECRAFT Roger, and listen closely

PAO This is Mission Control, Houston, we have acquisition through Hawaii at this time, should be getting downlink television momentarily of the deployment of the ANIK spacecraft.

CAPCOM Columbia, Houston, with you at Hawaii for 6 minutes, we'll have a very short keyhole after 4 minutes, probably less than 30 seconds.

SPACECRAFT Okay Brian, you want the dump now?

CAPCOM You are go for VTR.

SPACECRAFT Playing

CAPCOM Roger, we have a good picture.

Music and noise

END OF TAPE

CAPCOM And Joe, we have fantastic pictures and audio of that.

SPACECRAFT Okay. We thought you'd like that. Which audio did you like the countdown audio or the music audio?

CAPCOM We're polling the audience down here on that one.

SPACECRAFT And Brian, we heated up on 4D. That was done per your procedure 9 hours, 21 minutes, 40 seconds.

CAPCOM Roger. Thanks Vance.

SPACECRAFT And Brian, we have a question here on the water supply?

CAPCOM Roger. Go ahead.

SPACECRAFT We are presently dumping BRAVO to 50 percent per your instructions and we noticed that Charley and Delta each down to about 80 percent. It seemed to me yesterday they were up at 90. Where are we using that water?

CAPCOM Roger. Stand by.

SPACECRAFT Okay, didn't think we're (garble) any all day and I was just curious.

CAPCOM Columbia, Houston. In regards to the water question. We launched with 90 percent in tank C and 65 percent in D and after launch the tanks equalized out to about 78 percent in each, and they've been filling since then.

SPACECRAFT Okay, I thought we saw them, I guess we saw 1 in 90 yesterday, and assumed both of them were 90, right? Just curious.

CAPCOM Roger, that.

SPACECRAFT And Houston, it got a little cool last night when we were sleeping, so we think we'll, with your permission, move the cabin temp controller valve to perhaps 2/3 cooler or 1/3 cool.

CAPCOM Roger, we concur with that, Vance.

CAPCOM And Columbia, Houston, we're 30 seconds to go, and we're looking at a beautiful picture of the spacecraft against the ocean.

SPACECRAFT Right, we're watching on the monitor to, although we got kind of a scratchy black and white. We wouldn't trade places. We just wanted to share that with you tonight, Brian.

CAPCOM Roger, that's appreciated, thank you very much.
And next AOS will be Santiago at 9 + 53.

SPACECRAFT Okay.

CAPCOM Flight controller power off, please.

SPACECRAFT Okay.

PAO This is Mission Control, Houston. Loss of signal at Hawaii now, 19 minutes away from reacquisition at Santiago, Chile. Video tape playback onboard Columbia of the deployment of ANIK on the previous orbit, accompanied by the music from motion picture 2001, which in turn had been borrowed from a tone poem by Rikard Strous, thus (garble). We'll return in 18 minutes at Santiago. Crew preparing now for their presleep activity after their evening meal, most of the day's work having been completed. At 9 hours, 34 minutes, on the second day of STS-5, Mission Control, Houston.

END OF TAPE

END
DATE
FILMED

JAN 25

1983

Part

Ed.



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston Texas 77058

NOVEMBER 1982

STS-5 AIR/GROUND TRANSCRIPTS

PART 2

MET 01:09:34 THROUGH MET 03:09:39

PAO This is Mission Control, Houston. We have acquisition at Santiago, Chile.

CAPCOM Columbia, Houston, with you at Santiago for 6 minutes.

SPACECRAFT Roger, Brian. How do you read us? We're all down here on the mid deck.

CAPCOM Roger, Bob. I read you loud and clear.

SPACECRAFT Okay. Okay, Brian. I did complete the TV taping of the oxygen interaction validation status as of now prior to turning it on on your call later.

CAPCOM Roger.

SPACECRAFT Brian, got a question for you.

CAPCOM Roger, go ahead.

SPACECRAFT Heard the SRBs that made it down were sited. Did they make like submarines this time or did we get them back?

CAPCOM Stand by.

CAPCOM And Columbia on your question on SRBs, at last report both SRBs were under tow. They had a small problem with following seas making it a little slower for them. They had to periodically feel the SRBs with air, but they are under tow.

SPACECRAFT Outstanding.

CAPCOM And Columbia, Houston, we need you to have the 3 degree deadband called for on DAP B5 if you can check your DAP mode.

SPACECRAFT Okay, I'll go up and do that, Brian. I got time here. And we'll take the hit on that one and you want DAP B5?

CAPCOM That's affirmative. And Columbia, while you're down there, we'd like to go over the tag-up items with you.

SPACECRAFT We're listening but we may not be able to write. Go ahead.

CAPCOM Roger. The ANIK deploy was a real spectacular deploy today, and everyone down here had a lot of smiles.

SPACECRAFT We were smiling up here too babe.

CAPCOM As a matter of fact, most of us will be drinking beers at the Gilruth Center in about an hour and we'll be toasting you folks.

SPACECRAFT Well, after the toast save some for us.

CAPCOM Will do.

SPACECRAFT We keep searching and searching and we can't find any. We'd like to toast SBS and TELESTAT of Canada too.

CAPCOM Roger, copy that Vance and if you got a few seconds we were wondering how your medical DSOs went today.

SPACECRAFT Okay, slowly as we anticipated. Both Joe and I got off the EOG portion as we did report earlier and that went without a hitch except it took about twice as long as had been scheduled. The acceleration sensing we never tried because we knew it was going to take longer than we had and we were already behind and the kinesthetic repeatability also got skipped although we may get a chance to catch that yet tonight.

CAPCOM Roger, copy that Bill. Roughly the flight plan for tomorrow, we're looking for another COAS cal in the forward station with the morning IMU aligned. And you should use rigile or serious as the star.

SPACECRAFT Super idea.

CAPCOM And we're still looking at the aft COAS cal and we'll be asking for a short count also tomorrow at Yarragadee's pass on both UHF channels.

SPACECRAFT (garble) And we'll be getting the roll pitch angles for, initial angles for the star, I understand (garble).

CAPCOM Roger. Only anomalies to talk to you about tonight, the R4D heater, the control temp with the thruster firings, working on a plan to use the thermal test attitudes, and there's been a loss of the ru down here on MCC. We don't need any action on your part on that.

SPACECRAFT You better not.

CAPCOM And we have 20 seconds till LOS. We'll see you at Ascension at 10 plus 07 and we'll be sending up a state vector good message on the TPR sometime later after sleep and we'll have another message for you on the heater, R4D heater response for caution and warning a little later.

SPACECRAFT Okay, Brian. Did you see ECOMS line. I'm starting the fuel cell purge right now.

CAPCOM And we have 20 seconds till LOS, we'll see you Ascension at 10 + 07, and we'll be sending up a state vector good message on the TPR sometime later after sleep, and we'll have another message on the heater R4D heater response for caution and warning later.

SPACECRAFT Okay Brian, (garble) Z comm lines, I'm starting the fuel cell purge right now.

CAPCOM Roger, that.

PAO This is Mission Control, Houston, 50 seconds away from predicted acquisition of Ascension Island on orbit 23. This likely will be the last conversation of the evening before the crew of Columbia settles down for sleep period. We'll stand by for this final exchange.

CAPCOM Columbia, Houston with you at Ascension for 6 minutes.

SPACECRAFT Okay Brian, we're hearing you loud and clear.

CAPCOM Roger, and Vance, concerning the temperature in the cabin tonight, all other things being equal because of the attitudes today, we expect that it would be even cooler tonight in there and we would recommend 4 warm on the system if needed.

SPACECRAFT Okay, glad to hear that, we really didn't notice it was so cold at bedtime, but about 2 or 3 hours later without moving around, we were really freezing.

CAPCOM Roger, that, Vance. Feel free to use that system any way you want to keep yourselves the right temperature.

SPACECRAFT Righto, thanks.

SPACECRAFT And Brian, do I have your go to activate the oxygen interaction validation?

CAPCOM And Columbia, Houston, you're go for the oxygen interaction validation.

SPACECRAFT Okay, I'll go do it, easier to do than to talk about it.

SPACECRAFT Okay Brian, it is on the aft main B, aft payload B.

CAPCOM Roger, and we see the amps here, we saw that change.

CAPCOM And the signature temperature here shows that all the heaters are working.

SPACECRAFT Okay, very good.

CAPCOM And Columbia, Houston, follow up on the R4D jet heat system tonight.

SPACECRAFT Go ahead.

CAPCOM Roger, we don't expect one, but should you get an R4D leak message during the night, go ahead and check for quantity divergents. If there's no divergents, leave the manifold open. If you do see a divergents, go ahead and close the manifold.

SPACECRAFT Copy.

SPACECRAFT Houston, Columbia.

CAPCOM Roger, go ahead Columbia.

SPACECRAFT (garble) spec 68 is lying to me, other than the 2 bad ones, it looks like the dump is complete, you agree? I mean, not the dump, the fuel cell purge is complete.

CAPCOM And Bob, yes it is complete.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, 30 seconds to LOS, we'll see you at Guam at 10 + 50.

SPACECRAFT (garble)

PAO This is Mission Control, Houston. Loss of signal at Ascension Island, 35 minutes away from reacquisition at Guam, which will likely be the final pass of the day. Crew settles in after fairly long day of preparation for deploying the ANIK satellite, which went according to the text book and the checklist. At 10 hours, 15 minutes into day 2 of STS-5, Mission Control, Houston.

END OF TAPE

PAO At 10 hours 15 minutes into Day 2 of STS-5,
Mission Control, Houston.

PAO Shuttle Control Houston, we've acquired signal
over Guam.

CAPCOM Columbia, Houston, with you for 6 minutes over
Guam.

SPACECRAFT Hello Houston, this is Columbia. How do you read
us, over.

CAPCOM Roger, loud and clear.

SPACECRAFT Just out of curiosity, how do you read the mid
deck speaker?

CAPCOM Roger, it's loud and a little bit hollow. Just
like the nominal.

SPACECRAFT Well, just like our heads.

CAPCOM And Columbia, we got a couple of notes for you.
We recommend an item 16 on Spec 62 to inhibit the DECOM 3 FDA
when you've got a chance.

SPACECRAFT Item 16 (garble). Roger, Brian, I undertand
that. Thanks for reminding us. How does the (garble) engine
look to you now?

CAPCOM Roger, it looks great to us Bob.

SPACECRAFT Okay.

CAPCOM And Columbia, Houston, in reference to the sponge
experiment for Joe, you're right. There should have been 3
sponge packets in the pocket for run 3. You might want to look
in the rest of that locker to see if it was misfiled in the wrong
pocket. If you can't find it, don't worry. I've been advised
that it's not dangerous.

SPACECRAFT Okay, Brian. Thank you. We'll look all around
and be extra careful and if the mixture's exactly the same as in
sets 4, 5 and 6, I can just use the same procedures and continue
on so I won't lose the sample when and if I find it.

CAPCOM That's firm. If you do find it, we'd like you to
go ahead and activate it, record the time and just leave it on
the rest of the mission.

SPACECRAFT Okay, very good. Thank you.

CAPCOM And Columbia, a couple of notes on the ANIK. You really gave it a beautiful start in life and the TV coverage of the deploy was super.

SPACECRAFT Thank you Brian, appreciate it.

CAPCOM And the orbit looks good on the ANIK. We still don't have confirmation of the telemetry yet, but everything looks good so far on that spacecraft. And the ascent entry team will be with you tomorrow at 1900 at Orroral for your wake up and you can sleep well tonight. Your planning team is awake.

SPACECRAFT That's what we were afraid of. Anyway, Brian, I think we have a picture of the planning team that was sent up aboard our cap and we'll place it on the wall.

CAPCOM Roger that.

CAPCOM Columbia, Houston. How do you read?

SPACECRAFT You're loud and clear.

CAPCOM Okay, you got the planning team with you now and trust you'll sleep well this evening. We've got an official name now. We're called the gray team so we'll be referred to as the gray team come henceforth.

SPACECRAFT Okay, John. We understand that, but it's the racing gray I bet.

CAPCOM That's a firm and we've got a minute to LOS. Be waking you up in about 8 hours. Sleep well.

SPACECRAFT Okay, super. We appreciate that.

CAPCOM Goodnight.

SPACECRAFT Now John, don't let us oversleep babe.

CAPCOM We'll try not to.

PAO Mission Control, Houston. 1 day, 10 hours, 57 minutes mission elapsed time. We have loss of signal over the Guam tracking station on orbit number 24. The planning team Capcom John McBride is wished the crew a good night sleep and the planning team will be taking over here in Mission Control shortly to sit here through the night and watch the condition of the systems onboard Columbia. Things have gone very well through the day and we have the second successful satellite deployment. DPS flight control position reported that the three operable CRTs are in a sleep configuration indicating the crew is preparing to go

PAO 3 operable CRT's are in a sleep configuration and it could be indicating that the crew is preparing to go to sleep and has finished the business for the day. Currently planning to have a change of shift press conference with the off-going orbit team in about 30 minutes in Room 135 in Building 2 here at the Johnson Space Center. At 1 day 10 hours 58 minutes mission elapsed time this is Mission Control Houston. (garble) mission elapsed time. The Change of Shift briefing with the off going Orbit team Flight Director, John Cox, should be getting underway momentarily in Room 135, Building 2. We're about 45 seconds away from acquiring data over the Santiago tracking station in Chile. The crew is about 1/2 hour in their officially scheduled sleep period. And indications from the spacecraft are that they have configured their systems to begin that sleep period. 1 day 11 hours 28 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston 1 day 12 hours 35 minutes mission elapsed time. Columbia's just passed out of range of the tracking station at Guam. Flight controllers here in Mission Control are monitoring the systems onboard and everything continues to look good at this time. Columbia's on orbit number 25 now. Crew is only about an hour and 1/2 into their scheduled sleep period. This planning shift, of course tonight, will be preparing the teleprinter messages, making any adjustments in the crew activity plan for tomorrow and putting all that on the teleprinter to go up to the crew so that they'll have it in the morning first thing when they get up. At 1 day 12 hours 36 minutes mission elapsed time, this is Mission Control Houston. Mission Control Houston at 1 day 14 hours 16 minutes mission elapsed time. Columbia's currently on orbit number 26. We're not quite halfway into the crew's sleep period tonight. All systems continue to look good onboard the spacecraft being monitored here in Mission Control. Planning shift here this evening making some updates in the crew activity plan for tomorrow, although much of it remains as in the crew activity plan book. Mission so far has been very nominal. Very few problems to report. Very little special additional work to keep the flight controllers busy. Crew has a relatively light day scheduled for tomorrow. No major activities other than toward the end of the day astronauts Lenoir and Allen will begin preparing the equipment which will be used for their space walk on Sunday morning. Some of that equipment they will be taking out of storage lockers on the middeck and moving it into the airlock. At 1 day 14 hours 18 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston at 1 day 16 hours 9 minutes mission elapsed time. The change of shift press briefing scheduled for the planning team originally scheduled for approximately 1:50 a.m. Central Standard Time we're considering cancelling that at this time. We'll make that announcement again in about 10 minutes. And once again before we do announce cancellation, if there should be any need to hold a press conference to reinstate that. Any problems that develop that need discussion then we can reinstate that. But at the present

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time given that everything is very quiet here in Mission Control. We're considering cancelling that press conference. We will again repeat that announcement later before making a final decision to cancel that 1:50 a.m. Central Standard Time press conference. 1 day 16 hours 10 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston 1 day 16 hours 32 minutes mission elapsed time. This is just a ...

END OF TAPE

PAO One day 16 hours, 10 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, one day, 16 hours 32 minutes mission elapsed time. This is just to further, to repeat the announcement that we are planning to cancel the previously scheduled 1:50 a.m. Central Standard Time change of shift briefing. If we have no particular expression of interest on the part of the press within about the next 10 minutes, we'll put up the display that indicates we've cancelled that briefing, however, we will continue to monitor the activities in mission control during the night, and if anything comes up of interest, we'll be sure and put it out over the commentary circuit. And if there is anything that requires a press conference, we can always reinstitute that at this time, however, things go very smoothly right now as they did last night and it appears at this time that there is no real need to hold that press conference. We will however, wait about another 10 minutes before cancelling that. One day, 16 hours 33 minutes mission elapsed time. This is Mission Control Houston.

PAO Mission Control Houston, one day, 16 hours, 47 minutes mission elapsed time. This is the final announcement that we are cancelling the previously scheduled 1:50 a.m. Central Standard Time change of shift press conference. Things have been very quiet here tonight in Mission Control on the planning shift. No particular activities to announce or be reviewed. We will, of course, continue to monitor conditions thru the night and should it become necessary, we can reinstitute the press conference, however at the present time, everything continues to go very smooth and we see no particular reason to hold that press conference based on what we see right now. We have some other television opportunities that will be coming up in the morning, beginning at approximately 4:57 a.m. Central Standard Time. We will have a video tape replay of the OMS POD survey that had been a time spot that was scheduled for the downlink, or the replay of the TELESAT ANIK deploy and since we got that earlier we're going to be substituting the OMS POD survey. Mission Control Houston at one day 16 hours 59 minutes mission elapsed time. Just to repeat, we have cancelled the previously scheduled 1:50 a.m. Central Standard Time change of shift briefing. There appear to be no activities or events that require that briefing to be held. Should it become necessary during the course of the evening we can reinstitute that. To run down the list of the other scheduled television events coming up, in the morning beginning at 4:57 a.m. Central Standard Time we're having the video tape replay of the Orbital Maneuvering System POD survey, showing where there's some chipped pieces off some of the tile. There'll be a playback of that VTR at 5:20 a.m. Central Standard Time and we have the shift briefing following the off-going ascent and entry team shift and that will be at approximately 8:50 a.m. Central Standard Time. Then the next TV event is not

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till 2:19 p.m. in the afternoon, Central Time. The water dump and the air lock preparation, a playback of that to follow about 21 minute later at 2:40 p.m. and then the other change of shift briefing tomorrow at 4:20 p.m. Central Standard Time. At one day, 17 hours and 1 minutes mission elapsed time, this is Mission Control Houston.

PAO Mission Control Houston, one day 17 hours 57 minutes mission elapsed time. Flight controllers of the ascent and entry team are beginning to filter into Mission Control here for the beginning of their shift. We're about one hour away now from the scheduled wake up of the STS-5 crew. Columbia is on orbit number 29 just starting on orbit 29, beginning to pass out over the coast line at the northern tip of South America.....

END OF TAPE

PAO We're about 1 hour away now from the scheduled wake up of the STS-5 crew. Columbia is on orbit number 29 just starting on orbit 29 beginning to pass out over the coastline at the northern tip of South America. Just a reminder that we did cancel the change of shift briefing that had been tentatively scheduled for 1:50 a.m. Central Standard Time this morning, things have gone very well through the night, no new problems reported, only items of interest were the minor changes put on the teleprinter message to go up to the crew, only very few adjustments in the crew activity plan as things have gone very much according to the timeline in the previous few days. Crew activities scheduled for the flight day 3 include operating some of the student experiments onboard, gathering some medical data relating to the studies on space motion sickness and later in the day the preparation of equipment in the airlock for the early Sunday morning space walk by Mission Specialists Bill Lenoir and Joe Allen. At 1 day 17 hours 59 minutes mission elapsed time this is Mission Control Houston.

PAO This is Shuttle Control at 1 day 18 hours 55 minutes mission elapsed time, Columbia about 30 seconds away from acquisition through the Orroral station we expect to talk to the crew with a wakeup call at this station, we'll standby for conversation through Orroral.

Music (Cottoneye Joe)

SPACECRAFT Good morning Houston

CAPCOM Good morning Columbia, how do you read?

SPACECRAFT Very well

CAPCOM Hate to wake you up this early but we've got a lot of things for you to do today.

SPACECRAFT Okay, well we needed it. Was that (garble) music?

CAPCOM That's some of it we've got more for you later. We want you, if you would, to take a good look at your TPR messages we're not sure whether they came up real good on the last site, if not we'll resend them at Mila.

SPACECRAFT Okay Jon those are the messages on the teleprinter...

END OF TAPE

CAPCOM We want you, if you would, to take a good look at your TPR messages. We're not sure whether they came up real good on the last site. If not, we'll resend them at Mila.

SPACECRAFT Okay, Jon, those are messages on the teleprinter?

CAPCOM That's affirmative. Your mission summary and the CAP update and let us know at Mila if they're good. If not, we'll retransmit them real quickly.

SPACECRAFT Okay. At first glance they're pretty good. We've got one, let's see, on weather update, state vector update, and then we've got, we have two CAP activity timelines and one flight plan overview. Is that the sum of it?

CAPCOM We're happy to report that that is the sum of it. We're about a minute away from LOS here. We're going to turn over to the ivory team and we'll see you again tonight.

SPACECRAFT Okay planning team. We thank you all appreciate it very much. We slept safe and sound.

CAPCOM That's great. The ivory guys will talk to you at 19 32 and we'll see you tonight.

SPACECRAFT Roger, out.

PAO This is Shuttle Control Orroral has loss of signal now with Columbia. Next acquisition through Merritt Island in 31 minutes. Here in the Mission Control Center a shift handover is underway. The ivory team lead by Flight Director Tom Holloway is taking over from the team lead by Gary Coen. There will be no change of shift news conference. Wake up music this morning, as every Texan knows, was Cotton Eyed Joe. At 1 day 19 hours 2 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 19 hours 31 minutes mission elapsed time. The Columbia started its 30th orbit of the Earth a few minutes ago. We're standing by for acquisition through the Merritt Island, Florida tracking station.

CAPCOM This is Houston with you through Mila. Standing by.

SPACECRAFT Ok Bob . We're busy (garble) some stuff in CAP right now.

CAPCOM Okay Bob. Columbia, Houston, one addition to your teleprinter messages this morning. Site 12 for the ground OPS. Water has become good so if you have somebody loose to look at site 12 when you go over.

SPACECRAFT Okay Bob. And I'd like verification on the

requirement to crossfeed the left OMS. I've gone ahead and crossfeed some of the left OMS's and note that, at that further requirement has taken the left OMS crossfeed bravo to open and I guess I thought we were leaving that GPC for the rest of the mission.

CAPCOM To stand by Bob, we'll get right back to you. Okay Bob, we'd like to take that left OMS crossfeed back to GPC.

SPACECRAFT Okay, (garble) GPC. Is that affirm?

CAPCOM That's affirmative.

SPACECRAFT Okay, that's what you've got.

PAO This is Shuttle Control. The CAPCOM's on this shift are Bob Stewart and Roy Bridges.

CAPCOM Columbia, this is Houston. 30 seconds to LOS at Bermuda. We'll see you at Dakar at 4 7.

SPACECRAFT Okay Bob.

END OF TAPE

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CAPCOM Columbia, this is Houston. 30 seconds till LOS at Bermuda, we'll see you in Dakar at four seven.

SPACECRAFT Ok. Bob.

PAO This is Shuttle Control. Columbia is over the mid-Atlantic now, out of range of the Bermuda station. Next acquisition thru Dakar in just over 3 minutes. This is Shuttle Control at one day, 19 hours 47 minutes mission elapsed time. Columbia will be within range of Dakar in about 15 seconds. We'll standby.

CAPCOM Columbia, Houston's with you thru Dakar for six minutes.

SPACECRAFT Roger, Bob.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead, Bob.

CAPCOM Since ANIK has departed the bay, we'd like to inhibit the DCOM FDA 3 on. So if you could get SPEC 62 and it was in an item 16.

SPACECRAFT Okay, we'll do it. Hey Bob, are we about over the Sierra?

CAPCOM Say again, Columbia, we're approaching a keyhole and you're getting kind of broken.

SPACECRAFT Just wondering if we're over the Sierra right now. Lots of sand dunes down there.

CAPCOM Yes, you're over the Sierra.

SPACECRAFT I guess you can tell the Sierra anywhere. It's a beautiful sight though.

CAPCOM Columbia, we're 30 seconds of LOS at Madrid. Indian Ocean station is next at 20-zero-six.

SPACECRAFT Okay, Bob.

PAO This is Shuttle Control. Dakar has loss of signal with Columbia. The spacecraft is moving down across Africa now toward the Indian Ocean. Pilot Bob Overmyer remarking a few minutes ago that the Sierra Desert is a beautiful sight. Next acquisition is thru the Indian Ocean station in 10 and a half minutes. At one day 19 hours 55 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at one day 20 hours 6 minutes mission elapsed time. Columbia has acquisition thru the Indian Ocean station.

CAPCOM Columbia, this is Houston with you thru Indian Ocean for 8 minutes.

SPACECRAFT Roger, Bob.

CAPCOM I've got a couple, got one configuration for you here, we would like the N2 system 2 reg inlet open on panel two.

SPACECRAFT Okay, say it again, Bob. (garble)

CAPCOM Okay, that's N2 system 2 reg inlet opened.

SPACECRAFT Okay Bob, I just hit. N2 system 2 reg inlet opened now.

CAPCOM Okay, mighty fine. We see it now.

SPACECRAFT Okay Bob, is that it?

CAPCOM Yeah, that's it for configurations. If you've got somebody handy there we would like to know the status of your LiOH cannisters. What's installed where. Reason is they've got some new type of LiOH cannisters and the EECOM's down here don't have anything to do, so their interested in their performance this time.

SPACECRAFT Bob, this is Joe, how do you read?

CAPCOM Loud and clear Joe.

SPACECRAFT Okay, due to an oversight on my part Bob, we did not get the LiOH installed last night just before bed time. I did install it this morning at 1800. That's, I guess, day one slash 1800 hours. And that was LiOH cannister number 5 went in position A, and because we're coming up on another LiOH change shortly

END OF TAPE

SPACECRAFT We installed it this morning at 1800. That's I guess the day 1 slash 1800 hours and that was LiOH cannister number 5 went in position A and because we're coming up on another bio change shortly I put cannister number 6 in position B, over.

CAPCOM Okay Joe. Thanks a lot.

SPACECRAFT And just out of curiosity, do you have a reading of whether PP CO2 went up too last night?

CAPCOM We saw a 2.1 peak, Bob.

SPACECRAFT Okay.

CAPCOM And Columbia, when it's convenient we'd like you to check out the window and kind of give us a check on where the elevon position is right now.

SPACECRAFT The port inboard is full up. Bob, I'm looking over at the port. The inboard looks to be full up. Valve board looks like it's in trail.

CAPCOM Okay, Joe, how about starboard?

SPACECRAFT Bob, on the starboard side, the outward is about three-quarters way up and the inboard looks like they're full up.

CAPCOM Okay, starboard out, board is three-quarters up and inboard is full up?

SPACECRAFT That's a good number.

CAPCOM And we appreciate it. That will help the hydraulics folks in their modeling of the system onorbit.

SPACECRAFT Okay. Okay Bob, those the two inboards went to full up sometime yesterday and that's the first time I noted that that outboard has gone up on the starboard side. I agree with that.

CAPCOM Okay, we copy. Columbia, Houston, we're 30 seconds to LOS at Indian Ocean station. Talk to you next through Yarragadee.

SPACECRAFT Okay Bob.

PAO This is Shuttle Control. Columbia out over the Indian Ocean now. Next acquisition through Yarragadee, Australia in 7 minutes. Columbia's current orbit is 169 by 160 nautical miles. The orbital period is 1 hour 30 minutes 48 seconds. At 1

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day 20 hours 15 minutes this is Shuttle Control Houston. This is Shuttle Control at 1 day 20 hours 22 minutes mission elapsed time. Standing by for acquisition through Yarragadee.

CAPCOM Columbia, this is Houston with you through Yarragadee for 8 minutes.

SPACECRAFT Come on. If you have any traffic for us, we've got a couple of news of the world type questions to ask you, if you have time?

CAPCOM Okay, go ahead. We have no traffic for you.

SPACECRAFT How's the strike going? Are the Oilers playing football yet?

CAPCOM No, no football yet. About the only news of the world has been flying around down here with any sort of regularity is the Russian news.

SPACECRAFT Very very sorry to hear about the death of Premier President Brezhnev. And certainly wish the Soviet people, the Russians, well on their selection process for the next Premier. Bob, there's a little-known story I'll tell you someday how President Brezhnev was actually wearing my silver astronaut pin.

CAPCOM That would be a good story, but probably not for the loop right now. Can you keep it clean?

SPACECRAFT There's nothing to it. We were at a reception and the Soviet delegation gave the American delegation a number of items. We weren't prepared and I took off my silver astronaut pin and gave it to Tom Stanford, who presented it to the President Brezhnev...

END OF TAPE

SPACECRAFT ...the Soviet delegation gave the American delegation a number of items. We weren't prepared and I took off my silver astronaut pin and I gave it to Tom Stanford, who presented it to President Brezhnev.

CAPCOM I think that's an interesting comment Bob, and that was probably picked up by the news folks down here.

SPACECRAFT I should have said it, I'm sorry.

CAPCOM If you'll hold up a sign to the window maybe Joe Kerwin can receive a greeting from you personally now, seems like you're coming over his new residence.

SPACECRAFT Okay Bob. I can't believe the view Bob, I'm squatting on C6, my toes underneath the, where the little hole is under the center console there, and able to look out all the forward windows at one time, it's just spectacular. There's no way you can tell on film, I tell you.

CAPCOM Okay Bob, we're just down here trying to figure out what your view is, we got the FAO checking your pointing angle.

SPACECRAFT It's my view right out the window, there's a lot of land mass underneath me and, as you can see we haven't gotten our maps set up yet this morning.

CAPCOM Yeah you're passing over Australia.

SPACECRAFT Okay, that's what we figured.

CAPCOM And I figured you'd deduced that since we told you we told you we were talking to you through Yarragadee.

SPACECRAFT It's a little dense at times but it kind of stumps you once in a while. Joe slept kind of suspended near the teleprinter last night, and in the erie glow of the green radar teleprinter, I was suspended in the middeck floating around and every time I brushed against something I looked over and I saw this kind of body hanging over in this greenish glow.

CAPCOM Sounds more like a Halloween-type story doesn't it?

SPACECRAFT Yeah that's exactly what it looked like.

CAPCOM Roy's sitting over here frantically trying to find, trying to get a call through to Joe Kerwin and tell him to run outside and look up here.

SPACECRAFT Okay. We wish the folks down in Yarragadee would pass that word on to Joe, we certainly do appreciate what the folks at Yarragadee are doing for us, and all the support we're

getting throughout the whole net. And Bob we're maneuvering to the IMU align attitude.

CAPCOM Okay Bob, we're going to lose you for a couple of seconds here in the keyhole between Yarragadee and Orroral, be back with you shortly.

SPACECRAFT Okay. You there?

CAPCOM Hello Columbia, we're back with you through Orroral now.

SPACECRAFT Now Bob, a word for the surgeon if you're there, we're a little late on the excel detect sensitivity, you may be looking for traces on your biomed channels and we're not going to put any on for awhile, we're give you a call when we get to that. We're trying to clean stuff up here.

CAPCOM Okay Joe, and for your information we got Joe Kerwin on the land line right now, anything you want us to pass on to him?

SPACECRAFT Alright, give the word from yesterday he owes for the September coffee fund.

CAPCOM Okay we'll remind him.

SPACECRAFT And in addition, give our greetings to Joe and his family. We met them in the neighborhood and look forward to when they come back, know that their having a wonderful time in Australia though.

CAPCOM Columbia, Houston.

SPACECRAFT Go ahead

CAPCOM Is Joe Allen available?

SPACECRAFT Sure is, is this Joe Kerwin?

CAPCOM This is Roy, just had a conversation with Joe while you were over Yarragadee and first part of Orroral he had a little note he wanted to pass on to Joe and the rest of the crew.

SPACECRAFT Go ahead Roy.

CAPCOM Well, Dr. Kerwin says he considers it terribly unfair to have to pay his dues to the coffee mess when all he has a chance to drink is (garble) beer.

SPACECRAFT That last, what's all he has to drink?

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CAPCOM Australia beer.

SPACECRAFT That's right he gets to pay double for that.

CAPCOM (Laugh) Okay. He also wished you all that you
continue a very successful but...
END OF TAPE

SPACECRAFT You get to pay double for that.

CAPCOM Okay. He also wished you all that you continue a very successful, but a very boring flight. And he said that the great performance that you're turning in is being well received in Australia and the Pacific, and he wished you all the luck in the world.

SPACECRAFT Okay, Roy, thank you very much. We do appreciate it.

CAPCOM All I got to say Joe, is if he's talking about a boring flight he must be only talking about EECOM's because those PAM deploy pictures sure are exciting that's been sending down.

SPACECRAFT Terrific.

CAPCOM Yes, Joe, maybe I could have said it better. He wished that you would continue your successful flight to the point of being bored. That it is, that you have nothing but good things happen and nothing unexpected come up.

SPACECRAFT We understand exactly that Roy, and thank you.

CAPCOM And Columbia, we're 15 seconds to LOS at Orroral. Talk to you next through Mila.

SPACECRAFT Okay Bob.

CAPCOM And Mila will be at 21 07.

SPACECRAFT Okay.

PAO This is Shuttle Control. Orroral has loss of signal now. Columbia starting a track over the Pacific Ocean with next acquisition at Merritt Island, Florida in 29 minutes. Considerable amount of conversation between the crew and the ground during this pass over the continental Australia. Pilot Bob Overmyer asking about the news, in particular whether the National Football League strike has been settled. And in discussing the death of the Soviet President Brezhnev he reminded him that his astronaut pin was presented to Mr. Brezhnev during a reception in the Kremlin. That activity taking place during the preparations for the Apollo-Soyuz mission back in the mid 70's. That mission flown in July of 1975. Overmyer was a member of the support crew for that mission. Made several trips to the Soviet Union for crew training. Said he had a spectacular view of Australia out of all 4 windows. Didn't believe that the view could be captured on film. There was discussion about astronaut Joe Kerwin. One of the CAP COM's Roy Bridges was talking to Dr. Kerwin on the telephone in Australia. Dr. Kerwin is assigned as the NASA representative to Australia for a couple of years. Dr.

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Kerwin is a veteran of the Skylab mission. And Joe Allen reported that he and Bill Lenoir will be a little late performing the acceleration detection sensitivity test. That test scheduled for this time. It's purpose is to measure the threshold level at which the body will detect linear and angular acceleration and determine if the threshold changes during flight. Both of the Mission Specialists will be subjects for this test in which the subject is placed in a harness and suspended by...

END OF TAPE

PAO ...of the Mission Specialists will be subjects for this test in which the subject is placed in a harness and suspended by four springs, wears an eyeshield and ear plugs and the assisting crewmember initiates a head to foot and then a rotary oscillation of the test subject slowly increasing the amplitude till it is perceptible to the subject. The subject wears 5 electrodes detached to his face for this test. At 1 day 20 hours 41 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day 21 hours 6 minutes mission elapsed time. Columbia is on it's 31st orbit now and we should have acquisition through Merritt Island in about 10 seconds.

CAPCOM Columbia, Houston, with you through Mila and Bermuda for 12 minutes.

SPACECRAFT Roger Houston, loud and clear, we have some alignment CAL results to give you.

CAPCOM Okay Vance, first I'd like to ask you if you could give us the GNC SPEC 1 for some variable parameters? Okay, thank you Vance, we see it and we're ready to copy.

SPACECRAFT Okay, Bob did the IMU align stars 54 and 34, angular error to 0, starting out with the angles, plus X I'll give you just decimal and two digits on each, plus X, or rather, X, delta X is plus .25, -.16, -.19, delta Y plus .02 plus .01 plus .20, delta V plus .13, plus .04 plus .29 execution time, day 1 20 hours 3900.

CAPCOM Okay we copy Vance, that you.

SPACECRAFT Okay if you're ready the startrack threshold log.

CAPCOM Roger, ready.

SPACECRAFT Okay on -Y it was picked up at threshold number 1, you'll find it on the tape 12046, -Z threshold 2, you'll pick it up at 12044.

CAPCOM Okay we copy that.

SPACECRAFT And we had one, when we finished that, then I tried the plus X COAX verification and it worked this time, you just can't believe the difference when you have a bright star. I'll give you the results.

CAPCOM Okay.

SPACECRAFT Okay, there was a star 11 on the first mark we had

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an error of .81, we took it at 12056 and then we made two more marks to check it and we got .11 and .12.

CAPCOM Okay very good, and we're very happy it worked this time.

SPACECRAFT Well let me tell you why, why the star brightness makes a difference. It's, if a star is bright enough it's not overwhelmed by the radical, if you have a dim star, no matter how dim you make the radical it's still, it still cannot track the star to get it into the center, and I think it's as simple as that. Probably the combination of a slightly dirty windshield and a dim star is what did it to us, and probably if we got a bright star in the ...

END OF TAPE

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SPACECRAFTand I think its as simple as that, probably the combination of a slightly dirty windshield and a dim star is what did it, and probably if we got a bright star in the -2, we could do it as easily.

CAPCOM Okay, Vance. We'll think about whether we need to do anything more and let you know.

SPACECRAFT Okay. It's unbelievable how simple it is when you have a bright star. It just, we had it done in less than 5 minutes.

CAPCOM Well, great. I realize it was very frustrating before.

SPACECRAFT Hey, Roy?

CAPCOM Yes, sir.

SPACECRAFT Ask EECOM to look at the dump and give me an approximate time for dump complete and I set a timer for it if it's going to be a long time.

CAPCOM Okay, standby.

CAPCOM Columbia, Houston, Bob you can set your timer for eight five minutes.

SPACECRAFT Eight five. Yeah that's what I figured out. I figured about eighty, but that's a long time to worry about something so I'll set a timer.

CAPCOM Good idea. Columbia, Houston. Verify DAP, bravo 5 deadband for attitude.

SPACECRAFT Okay, we'll check it.

CAPCOM Columbia, Houston. We're one minute LOS and we'll be seeing you in Dakar about 23 after the hour. One reminder on doing the PAM ASE thermal test. We want to make sure you do it on both of the spacecraft ASE.

SPACECRAFT Okay, we've got that Roy, and we'll see you at Dakar.

CAPCOM Roger. .

PAO This is Shuttle Control. Bermuda has loss of signal. Next station is Dakar in two and a half minutes. At one day, 21 hours 20 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at one day 21 hours 22 minutes mission elapsed time. Standing by for acquisition thru

Dakar. This is the breakfast hour aboard Columbia.

CAPCOM Columbia, Houston, with you at Dakar for 7 and a half minutes.

SPACECRAFT Okay, loud and clear.

CAPCOM Vance, if its not inconvenient to you, we'd like for you to leave one of your forward ADI's selected to inertial.

SPACECRAFT Okay, that'll be easy. We'll leave the left one on inertial.

CAPCOM Okay, thank you. And Columbia, Houston. Vance, we're going to use SPEC 1 again. We see you already have it called up. I'll let you know when were finished.

SPACECRAFT Okay.

CAPCOM Columbia, Houston we're finished with CRT 1 SPEC 1.

SPACECRAFT Roger, Houston. Well, having a little breakfast up here, Roy. Probably early breakfast Houston time.

CAPCOM Well, we just got a go from our monitor here that we're okay to have an early lunch.

SPACECRAFT You guys been working a long time.

CAPCOM What's on the menu today?

SPACECRAFT Scrambled eggs, Bob said something about just getting them loose all over the middeck, I guess we'll have to see how many of them we actually eat here. Hey, this has got to be the world's biggest challenge here. The scrambled eggs weren't quite dehydrated or rehydrated enough and we had them on cooking a little bit. Maybe a little bit too long while we were doing that IMU align. I opened up the bag and I'm getting some in my mouth, but it's unbelievable the amount of egg we've got all over the middeck right at the moment.

CAPCOM Well, that just sounds, sounds pretty good. I guess the guy thats drawing clean-up detail today isn't too happy about it though.

SPACECRAFT I think I'm that guy today though.

coast.....
Yep, serves him right! Just coming over the

END OF TAPE

CAPCOM ...the guy that's drawing clean-up detail today is not too happy about it though.

SPACECRAFT I think I'm that guy though.

SPACECRAFT Yep, serves him right. Just coming over the coast of Africa now and we can see the Sahara and all the streak sands from strong winds, really reddish sand quite interesting. Well Roy wish me luck. I'm going to try the sausage now.

CAPCOM Yes, we're just commenting down here Bob. Scrambled eggs and sausage sounds a lot better than bologna sandwiches.

SPACECRAFT Well, these are very good. I guarantee it.

CAPCOM I'm sure Rita will be very happy to hear that.

SPACECRAFT She doesn't believe me because she knows I'm a chow hound anyway.

CAPCOM Columbia, Houston, we're about 30 seconds LOS. See you at Indian Ocean at 42 and don't burn the toast Bob.

SPACECRAFT If he does right we got a lot more. I swear there's enough food to keep us up here a month. That's the best idea Vance has had all day. Let's stay a month.

CAPCOM Well, we'll look into it, but probably be getting you home on Tuesday. Got a lot of folks here anxious to have you back.

SPACECRAFT Just want the airplane back, that's all. Roy, don't we have to wait till the lakebed dries out.

CAPCOM No, too bad. John wants to get that thing cleaned up for his flight.

SPACECRAFT We'll have all the scrambled eggs ate up by his flight. See you at Indian Ocean.

CAPCOM See you.

PAO This is Shuttle Control Dakar has loss of signal. Next station is the Indian Ocean station in 10 and 1/2 minutes. Bob Overmyer has had an accident with the scrambled eggs and he says they're floating all over the middeck. He did comment that the eggs and the sausage are very good. Their reference to Rita is to Rita Rapp who has been working in planning astronaut meals and menus for many years here at the Johnson Space Center. Vance Brand gave a brief description of the Sahara Desert as Columbia crossed the coast of Africa. At 1 day 21 hours 33 minutes

mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 21 hours 42 minutes mission elapsed time. We have acquisition through the Indian Ocean station.

CAPCOM Columbia, Houston, with you at Indian Ocean for 7 minutes.

SPACECRAFT Okay, we're just crossing over the Indian Ocean and loud and clear.

CAPCOM Okay, you came in very weak that time. Might try one more time.

SPACECRAFT Okay, we're hearing you loud and clear.

CAPCOM Okay, well I can hear you, Vance, and we may be our COMM problem. We'll leave you alone while you have your breakfast, okay?

SPACECRAFT Okay. Roy, can you read me, this is Joe, over?

CAPCOM Yes, I heard you five by initially Joe, and then you faded out. Let us check our COMM down here.

SPACECRAFT Okay, give a call. Bert you there?

CAPCOM Yes sir, hear you five by now.

SPACECRAFT We spent the last five minutes wrestling with the heat for the food warmer and I think it's winning. It's got a there's as many rehydratable for heat as we had for breakfast this morning, it just becomes a handful of everything and it is.

CAPCOM You mean as far as amount of time it takes to get everything warmed up?

SPACECRAFT What I mean is...

END OF TAPE

SPACECRAFT (garble) for heat as we had for breakfast this morning it just becomes a handful of everything and its ...

CAPCOM You mean as for as the amount of time it takes to get everything warmed up?

SPACECRAFT What I mean is the package: won't stay in there neatly. When you get the 8 ounces of water in the coffee they expand so much that they don't want to sit down into the matting rack. So everytime you open up the heat for the foot warmer you gotta have five hands because they all come floating out. And man it is just a wrestling match and you're floating in the middle of the middeck wrestling with the food warmer and it wins every time.

CAPCOM Okay, we have visions of that now and it sounds a little sort of funny. Unless you're the one responsible for putting it all back in?

SPACECRAFT That's kind of my reaction. It's funny as the devil if you're watching somebody do it, but when you have to do it by yourself it's very frustrating.

CAPCOM Right. I noticed somebody up on the flight deck, if there's somebody there, we'd like to have a GNC SPEC 1 again for some more variable parameters. We were getting some data for the COAX CAL.

SPACECRAFT Okay we'll just see (garble) work Roy. I crashed in. On your teleprinter message this morning I'm assuming you'd like pictures of the port POD and the little chips of tiles that we see there. Is that correct, and you want that on the VTR dump to you shortly.

CAPCOM Standby Joe and I'll recheck that.

SPACECRAFT Okay, I just need a time about when you want the VTR that down. I'm got about 1 minute of it. It's pretty clear. I think nothing to worry about, but for completeness would be pleased to send it down to you.

CAPCOM Okay Joe. Your description is exactly what we want and we're setting up to take it at Mila on the next pass. And we've got a Mila AOS next time of 22 hours and 44 minutes.

SPACECRAFT Copy. We copy that.

CAPCOM Okay.

SPACECRAFT How about a little Doug Kershaw this morning?

CAPCOM Well, thank you very much for the music. I think

we got a ways to go before we're going to turn that into a good high-fidelity transmitting instrument. We've got you set up for both Goldstone and Mila next time so we've got plenty of time to catch your dump. Goldstone is 22 38 AOS.

SPACECRAFT Okay, very good. And Roy, tell the PAO people that if they don't like the music they oughta just turn that channel off.

CAPCOM Okay Joe, I think they copied and we'll be going LOS here just a moment. We'll see you at Yarragadee at 58.

SPACECRAFT Roger that.

PAO This is Shuttle Control Columbia's out of range of the Indian Ocean station now. Next acquisition through Yarragadee in 7 and 1/2 minutes. During the next pass over the continental United States we're getting about 51 minutes from now, 4:57 a.m. Central Standard Time we expect some television from Columbia. This will be a dump from the video tape recorder aboard Columbia of the OMS POD survey that was shot yesterday. Joe Allen indicating there's about 1 minutes worth of tape of that activity. We'll be set up to take that from Goldstone and also from Merritt Island. Bob Overmyer indicating he's having somewhat of a problem with the food warmer. When he opens it all the dehydratable packages float out and he has to catch them and stuff them back in the food warmer.

END OF TAPE

PAO when he opens all the dehydratable packages float out and he has to catch them and stuff them back in the food warmer, at 1 day 21 hours 52 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 21 hours 58 minutes mission elapsed time standing by for acquisition of Columbia through Yarragadee.

CAPCOM Columbia, Houston, with you at Yarragadee for 8 minutes.

SPACECRAFT You're loud and clear.

CAPCOM And you're loud and clear. Go ahead you can have it.

SPACECRAFT (garble)

CAPCOM Gotcha Vance.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT All right sometime today we'll probably, if you don't mind, we'll probably record on to one of the ICOM loops from habitability comments that we're trying pull together here for distribution to the appropriate people and then for our postflight.

SPACECRAFT Which ICOM loop would you prefer, ICOM alpha, or ICOM bravo?

CAPCOM Standby and we'll check. Columbia, Houston, we're about 20 seconds LOS, we're pick you up at Orroral in about 1 minute and in answer to your question Bob, you could put it on either ICOM loop, just tell us which one and when you do it for our use in tracking where it is on the dump.

SPACECRAFT Super.

CAPCOM Columbia, Houston, with you through Orroral for 2 minutes.

SPACECRAFT Okay Houston, Columbia, loud and clear.

CAPCOM Okay Vance I hear you, you're weak again.

SPACECRAFT Roger I'll check my batteries. (garble) right?

CAPCOM Columbia, Houston

SPACECRAFT Alright

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CAPCOM Columbia, Houston, the water dump will be over a little earlier than what your timer is set for. We show it will be finished in 5 minutes.

SPACECRAFT Okay Roy, I see that too. We're down to 15% right now. How's my COMM Roy, how do you read me?

CAPCOM Well I'm just barely picking you up Bob and it could be our problem here on the ground, we show a good signal strength coming down from you but we're not receiving it on the console. Columbia, Houston, a reminder on the ASE thermal test we haven't seen any indication that you started it and we'll see you at Buckhorn at 36.

PAO This is Shuttle Control, Orroral has loss of signal with Columbia. Next acquisition through the Buckhorn station in California in 25 minutes. During this pass, this next pass over the United States we will have the video tape recorder dump from Columbia of the OMS POD survey, at 1 day 22 hours 11 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 22 hours 35 minutes mission elapsed time. We're standing by for an acquisition through Buckhorn approximately 2 minutes after acquisition there we will acquire the Goldstone station and have capability to dump the video tape recorder. Joe Allen indicating about 1 minute's worth of tape.

END OF FILE

PAO ...will acquire the Goldstone station and have capability to dump the video tape recorder. Joe Allen indicating about 1 minutes worth of tape on that recorder of the OMS POD survey. Following the tape dump there is a possibility we may get some live television from the payload bay cameras.

CAPCOM Columbia, this is Houston, with you through Buckhorn.

SPACECRAFT Roger, Houston, loud and clear. And Houston, we've completed the hot fire test. It went well. No anomalies. We are set up for the VRCS single engine soakback and deselected R2D and R3D.

CAPCOM Okay Vance. Looks like you got a good configuration here. And Vance, could you ask Joe or Bill to give us some words on the thermal soakback not thermal soakback but the ASE PAM heater test.

SPACECRAFT Bob, this is Joe, the data take for the ANIK is now in process. It should finish in about 1 minute and as a matter of fact there's my 5 minute alarm right now. You just have 5 minutes of data on your recorder at this moment for ANIK, and 5 minutes previous to that I recorded the thermal data for the FDS. And check it out and if it's okay we'll press on.

CAPCOM Okay Joe, that's mighty fine. We've got the data

SPACECRAFT Okay, be curious if it shows you anything different than you expect.

CAPCOM Okay, we'll get back to you if we see any anomalies.

SPACECRAFT Roger.

CAPCOM Columbia, this is Houston, we recommend auto on the DAP.

SPACECRAFT Roger, Adam.

CAPCOM Columbia, Houston, we're configured and we've got Goldstone acquisition now so we're ready to start the VTR.

SPACECRAFT Okay, go ahead, Bob.

CAPCOM Okay Joe, we've got the ground configured and everything. We're ready for the VTR dump if you're ready.

SPACECRAFT Okay, standby. Okay Bob, you should be seeing just a trace of a water dump. I don't know if you have any white

particles showing in this scene are not. It's going to end in just a moment and you'll get a close-up as good as we can do of the OMS POD verniers. It's on the portside and you'll see two triangular shaped tiles that are chipped off. They don't look particularly serious from here even through the binoculars. I'm assuming that's what you wanted to see a close-up over.

CAPCOM Joe, we didn't have any TV at all. In fact we still don't have any TV downlink.

SPACECRAFT Okay, standby.

CAPCOM Joe, we're LOS at Goldstone now. We'll have to get it at Mila.

SPACECRAFT Okay, Bob, that may have been my error. Let me give it to you at Mila.

CAPCOM Okay, mighty fine. And Columbia we're 20 seconds to LOS. We'll pick you up at Mila at 4 4.

SPACECRAFT Okay. Okay, Bob, but I'll be transmitting when you come up. I'm sorry that I missed that one.

CAPCOM Okay, no problem. Columbia, this is Houston, with you through Mila.

SPACECRAFT Okay Houston, loud and clear.

CAPCOM Okay, Columbia, we're getting the downlink now on the TV.

SPACECRAFT Okay Bob, and how much time do you have here?

CAPCOM Oh, we've got a pretty good bit Joe, and we've got 5 minutes at Mila.

SPACECRAFT Okay, this is the lead in, may be in a little bit more of the water dump than you want. But you should get the other shortly. I'd be interested, do you see any water specs, at all, in there?

END OF TAPE

SPACECRAFT Okay, this is the lead in, it may be a little bit more of the water dump than you want. You should get the other shortly. I'd be interested, do you see water specs at all in this?

CAPCOM No Joe, I really can't see anything. We're just seeing the terminator crossing the screen now.

SPACECRAFT And there the two missing parts of tile, you should see it fairly clearly now.

CAPCOM Yeah, we got a good picture on that.

SPACECRAFT And that's the end of the dump, Bob.

CAPCOM Okay Joe, that was a good picture. You could practically read the numbers on the tile from here.

SPACECRAFT That's good. I'll give you some live TV if you want it right now.

CAPCOM That would be super.

SPACECRAFT You want it?

CAPCOM Yeah, go ahead.

SPACECRAFT Bob, I'm going to be real careful. I don't want to look into the Sun.

CAPCOM Joe, do you think you might get some Earth in the background for us on this shot?

SPACECRAFT Bob, I'm afraid to look. The Sun is right there, hang on just a second. You'll see the horizon come now with the Sun coming up. And a very bright line on the right side of the vertical stabilizer.

CAPCOM Yeah, we got a good shot on it Joe.

SPACECRAFT Okay, I'm going to come over a little bit more. Sure looks like a lot of dry area down there. Where are we over right now, Bob?

CAPCOM Should be just crossing Florida.

SPACECRAFT Okay, that's just the cloud deck with the red sun. Sun going to be up shortly, we can see it on the horizon.

CAPCOM That's some real pretty pictures, Joe. Too bad you can't see it in color. Too bad we can't see it for real.

SPACECRAFT We don't mind the monitor being black and white. Tell our friends to keep their eyes on the monitor. Breathtaking, absolutely breathtaking. There are many, many hands of blue in the atmosphere before it touches the Earth. And it probably looks just like a small ribbon to to you Bob, ?

CAPCOM Yeah, we can't really see your hands of blue Joe. We got a real good picture of good horizon.

SPACECRAFT Okay I'm going to pan it up now and let you look at the straight down, if you have a few more minutes.

CAPCOM Yes sir, we should have a few more minutes.

SPACECRAFT Bob? Houston, the ECLS set redundant component check is completed looks good.

CAPCOM Okay Vance we copy.

SPACECRAFT And we're looking right down at the Atlantic ocean now Robert. It looks pretty cloudy up ahead.

CAPCOM Joe we're seeing a bright, white spot on the center of the picture. Could you give us a hint of what that might be?

SPACECRAFT Yes, I think it's a secondary reflection in the lens of the camera itself Bob, because let me pan it to the right and you'll see it move. Yeah it moves and now it's out of the picture a little bit. Out of our monitor picture, but it's secondary reflection in the TV camera. We're coming real close to looking into the Sun, so we're cutting that pretty fine up here.

CAPCOM Okay, we're getting kind of weak on the MILA, we're going to through a MILA keyhole and we'll lose TV signal here.

SPACECRAFT Okay, we'll show you some more later, if you keep the TV links up.

CAPCOM Okay, sir we'll do it. And Columbia, this is Houston, this is a reminder, we'd like to get the DFI power up so we can check your tile pressure here.

CAPCOM Columbia this is Houston. We'd like to get a GNC SPEC 1 again please.

SPACECRAFT Okay, you have the spec 1 in GFI power up is complete.

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CAPCOM We'd like to get a GNC SPEC 1 again please.

SPACECRAFT Do you have the SPEC 1 and the DFI power up complete?

CAPCOM Okay Vance and just word to you on the PAM ASE thermal test, looks like ANIK is holding about 36 degrees and SBS is holding about 26, everything looks fine.

SPACECRAFT Okay real good.

CAPCOM Columbia, Houston, variable parameter onboard again you can have that SPEC 1 back.

SPACECRAFT Thank you. Did you find it? This is Columbia, how do you read?

CAPCOM You're loud and clear.

SPACECRAFT Hey Bob, what is going through the STS-5 message board down there I noticed the appointment I missed at 6:15 on Tuesday. I was wondering if you could check on that, I did a whole bunch of no handed pushups downstairs and see if we could count those, would you?

CAPCOM I'll check on that, but that sounds like a flakey substitute.

SPACECRAFT Oh no, a lot of hard work babe.

CAPCOM Columbia we're 20 seconds to LOS, Dakar is next at 2258.

SPACECRAFT (garble)

PAO This is Shuttle Control, Columbia's out of range of Bermuda next station is Dakar in 2 minutes 45 seconds. Vance Brand reporting during this pass over the United States that the reaction control system test went well also the tests on the the vernier engine, the small RCS engine. We got a look at the video tape recorder dump which showed parts of two tiles missing from the OMS POD and then we had a period of live television of the payload bay and some Earth views with Joe Allen describing the Sunrise. Columbia's in orbit number 32 now and at 1 day 22 hours 56 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at 1 day 22 hours 58 minutes mission elapsed time. Standing by for acquisition through Dakar.

CAPCOM Columbia this is Houston through Dakar.

SPACECRAFT Houston we're reading you loud and clear

CAPCOM Okay Vance we got a pretty long pass here about 9 minutes and we're through with the DFI power so you can get those signal conditioners off if you desire, or run your power pressures through the computer here.

SPACECRAFT All right.

CAPCOM And got a comment for Joe, Joe on your TV stuff the only schedule TV for the remainder day is Hawaii on REV 38 it takes about an hour or an hour and a half to set up a site for TV so if you've got something that you want to dump give us that much notice.

SPACECRAFT Okay Bob, I understand on the REV 38 that's in addition to the planned TV pass, is that correct?

CAPCOM That is the plan TV pass Joe.

SPACECRAFT Well okay, the way I have it set up according to the checklist as I understand it, that's live TV and we'll put the rest on tape.

CAPCOM Okay that sounds fine.

SPACECRAFT Houston Columbia

CAPCOM Go ahead Columbia

SPACECRAFT Roger Bob, we'd like to ask for a PMC at Yarragadee?

CAPCOM Okay PMC at Yarragadee. Vance this is Houston.

SPACECRAFT Go ahead.

END OF TAPE

CAPCOM Okay, PMC at Yarragadee. Vance, this is Houston.

SPACECRAFT Bob.

CAPCOM Yes, be advised Yarragadee is a UHF only site and we really can't assure a privacy on that conference. That's your next shot at a good assured privacy on that conference is Hawaii.

SPACECRAFT Okay let's do it there.

CAPCOM Okay, will do.

SPACECRAFT Bob, we've got the runway at Dakar spotted right now. We can see it visually, Bob, with the naked eye.

CAPCOM Well that's good. As long as you're seeing it from this altitude, I hope we never have to see it up closer.

SPACECRAFT Drink to that.

CAPCOM From the looks of our flight board here in Mission Control. It looks like they're just about to fly down a NASA trajectory. So you might want to look a little further down track.

SPACECRAFT (garble) Good idea.

CAPCOM Columbia, Houston, we're about 5 seconds to LOS and we'll talk to you next through Yarragadee.

PAO This is Shuttle Control. Dakar has loss of signal. Columbia's next acquisition through Yarragadee, Australia in about 9 minutes. Yarragadee, the way that Yarragadee is about 25 and 1/2 minutes. There's a very low elevation pass at Botswana in about 9 minutes but elevation is slow and we will not acquire there. Yarragadee in about 25 minutes. Crew reporting that they could see the runway at Dakar airport. That was their transatlantic abort runway on launch. And Vance Brand has requested a private medical conference. That conference will be scheduled at Hawaii and in about 51 minutes. At 1 day 23 hours 9 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control with 1 day 23 hours 34 minutes mission elapsed time. We're processing Columbia data through Yarragadee now.

CAPCOM Columbia, this is Houston, with you through Yarragadee.

SPACECRAFT Roger, Roger, Houston, loud and clear.

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CAPCOM Okay, Vance, we're ready for those UHF long counts if your're ready to give them to us.

SPACECRAFT Starting out first on 2 59 7. 1 2 3 4 5 6 7 8 9 10 9 8 7 6 5 4 3 2 1. And Bob, have FAO make note if you would please, for video tape cassette number 19 is starting with the TV test that shows how much scattered light or reflected light winds up down in the payload bay as the sun sets over the (garble) of the Orbiter.

CAPCOM Okay Joe, we copy that.

SPACECRAFT 3 again, same frequency. 1 2 3 4 5 6 7 8 9 10 9 8 7 6 5 4 3 2 1 over.

CAPCOM Okay Vance, we copy that. We're ready for 296A.

SPACECRAFT Okay, I'll switch and wait a minute.

END OF TAPE

CAPCOM Okay, Vance. We copy that. We're ready for 2968.

SPACECRAFT Okay, I'll switch and wait a minute.

CAPCOM And Vance, we're configured 2968.

SPACECRAFT Okay, we are starting count 2968. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, over.

SPACECRAFT Okay, Columbia starting another count, 2968. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, over.

CAPCOM Okay, Vance we got good copy on both those counts and I guess we can go back to 2597 now.

SPACECRAFT Okay.

CAPCOM Columbia, this is Houston. We're 30 seconds to LOS at Yarragadee. Hawaii will be next at 1 minute pass the hour and we'll be setting you up for a PMC at Hawaii.

SPACECRAFT Okay, Bob. We copy that, thank you.

PAO This is Shuttle Control. Columbia is over the center of Australia now out of range at Yarragadee, does not go within the range of the Orroral station on this orbit. The next station is Hawaii in 17 1/2 minutes. At 1 day 23 hours 43 minutes mission elapsed time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 2 days mission elapsed time. Columbia's lock on to the station at Hawaii now. Crew is engaged in a private medical conversation with flight surgeons. We'll stand by for any air/ground conversation that might occur at Hawaii after the private medical comm. This is Shuttle Control. Hawaii has had loss of signal. Next acquisition is through Buckhorn in a minute and a half. We'll stand by.

CAPCOM Columbia, Houston. With you through Buckhorn and Mila for 19 1/2 minutes.

SPACECRAFT Okay, we copy.

CAPCOM Roger, and we copy you 5-by.

SPACECRAFT And Roy, is that teleprinter message, one of many to come or can I take this out now?

CAPCOM Columbia, Houston. We have a weather message coming. Columbia, Houston.

SPACECRAFT Go ahead, Houston. How do you read?

CAPCOM Okay, you're 5-by and Joe, if you all are finished making your habitability comments on the recorder, we'd like to know which loop and when you started that.

SPACECRAFT Roy, I understand habitability comments on the recorder and I didn't follow what you said next.

CAPCOM Roger, I understood you all were going to put comments on the recorder if you already done it. We just wanted to know when and what loops.

SPACECRAFT We haven't done it yet, Roy. I catch you, I'll let you know as soon as I do it. I'm writing my notes right now and I'll give those to you.

CAPCOM Okay, thank you very much, Bob. And we're in no big rush. Just wanted to get working on it if you had already finished.

SPACECRAFT Oh, and by the way, I just ran the treadmill and by my calculations I ran about 36, 36 hundred miles so with that 1 item on my SGS message board, will you contact the proper people and get me credit or is that 6:15 appointment?

CAPCOM Okay, Bob. We'll give it a try. Hank said he ran 8 thousand. You got a ways to go.

SPACECRAFT (garble) the way I look at it, it was only a 3 mile run.

CAPCOM Roger.

SPACECRAFT And Roy, are you send out just a single teleprinter message? If so, I'll go ahead and post it.

CAPCOM That's affirmative. Only one message on the weather.

SPACECRAFT Okay.

END OF TAPE

SPACECRAFT Roger.

SPACECRAFT And Roy, are you'll sending up just a single teleprinter message, if so I'll go ahead and post it.

CAPCOM That's affirmative, only one message on the weather.

SPACECRAFT Okay.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT You might be interested, just

CAPCOM And you dropped out Bob, say again.

SPACECRAFT Columbia again. It seems to be right along that upper door edge, it must be cold or something.

CAPCOM Okay Bob, I'm sorry about it, but we went through a keyhole there, we didn't know about, so you'll have to give us that again.

SPACECRAFT Just wanted to tell you that we had to mop up a lot of excess water coming up around the LiOH door, it looks like it's condensation right along the cold beam there at the LiOH door (garble) down on. It was enough there when I was running the treadmill it kept spurting as the doors go up and down. It kept spurting up water, I think we got it mopped up pretty well. It's probably due to our cold attitude, do you think?

CAPCOM Well, we'll think about that, and let you know.

SPACECRAFT We didn't have it earlier, so this just started from last night.

CAPCOM Okay Bob.

CAPCOM Columbia, Houston. Bob, we'll keep an eye on the water quantity levels for you, and we'd like for you to keep an eye on the amount of condensate that builds up in that area, and let us know about it.

SPACECRAFT We'll keep you posted, right now it's dry, we got it all mopped up pretty well.

CAPCOM Roger, understand.

CAPCOM Columbia, Houston, we're 1 minute LOS, see you at Dakar at 35, and like to know if somebody's running the treadmill right now?

SPACECRAFT Negative.

CAPCOM Okay.

SPACECRAFT Trying to find my coffee with cream and I can't find it.

CAPCOM Can't find your what?

SPACECRAFT Coffee with cream.

CAPCOM Oh, oh okay.

PAO This is Shuttle Control, Bermuda has loss of signal, next station is Dakar in 4 minutes. During this pass, Bob Overmyer completed an exercise period, he calculated he ran 3600 miles on the treadmill and wants to ensure he gets proper credit for it. He reported seeing some water around the lithium hydroxide cannister compartment, that was mopped up, not quite sure where that water comes from, whether it's condensate or something else. The ECOM reports he sees no evidence of the water tank leak, they are continuing to watch that situation. After the mop up the area is still dry now, Overmyer reported. We'll stand by for acquisition through Dakar in about 2 and 1/2 minutes. And at 2 days 32 minutes Mission Elapsed Time, this is Shuttle Control Houston.

CAPCOM Columbia, Houston with you through Dakar for 11 minutes.

SPACECRAFT Okay Bob, we got you.

CAPCOM Your're 5 by, too.

SPACECRAFT Roy, I'm sorry?

PAO This is Shuttle Control, 2 days 36 minutes Mission Elapsed Time. We have acquisition through Dakar.

SPACECRAFT And Roy, Columbia, how me?

CAPCOM I read you 5 by Bob, I mean ...

SPACECRAFT Okay, I'm doing the work on that 0040 on the helium press reg swaps.

CAPCOM Roger.

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SPACECRAFT I've just taken helium press bravo on the aft right RCS to open in the GPC, I assume you want that done and all those concerns prior to launch are going away, is that affirm?

CAPCOM Okay Bob, we don't have any concern anymore, we'd like for you to follow the CAP.

END OF TAPE

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CAPCOM Okay, Bob, we don't have any concern anymore, like for you to follow the CAP.

SPACECRAFT Roy, I'm turning on the step 1 of the PRFD performance step for the CAP.

CAPCOM Okay, Bob, we copy that.

CAPCOM Columbia, Houston, 1 minute LOS, see you at Botswana at 51.

SPACECRAFT Okay, Roy. See you then Roy, thank you.

CAPCOM Roger.

PAO This is Shuttle Control, Columbia has moved out of range of Ascension. Next station is Botswana in 4 and a half minutes. At 2 days, 46 minutes, mission elapsed time, this is Shuttle Control, Houston.

CAPCOM Columbia, Houston with you through Botswana for 6 and a half minutes.

SPACECRAFT Okay, Roy, we copy.

CAPCOM And you're 5 by.

CAPCOM Columbia, Houston we're 30 seconds LOS, and we'll see you at Yarragadee at 10 after.

SPACECRAFT Okay Roy, we look forward to it.

PAO This is Shuttle Control, Botswana has loss of signal with Columbia. Next acquisition is Yarragadee in 12 minutes. At 2 days, 58 minutes, mission elapsed time, this is Shuttle Control, Houston.

CAPCOM Columbia, Houston with you through Yarragadee for 7 and 1 half minutes.

SPACECRAFT Roger.

PAO This is Shuttle Control, we're processing Columbia data through Yarragadee now.

SPACECRAFT Houston, Columbia, we have a question.

CAPCOM Go ahead.

SPACECRAFT I'm coming up on step 2 of the PRFD performance powerup, and the only question is, do we do that powerup even if

the pressures are not down yet, or do we wait till the pressure get down, or do I do it on time?

CAPCOM Columbia, Houston, you can do it whichever one comes first, either the pressure limit, or the time limit.

SPACECRAFT Okay, I got that.

SPACECRAFT And looking ahead Roy, we'll never do step 3, we'll end up doing the LSD firing to substitute step 3, is that affirm?

CAPCOM That's affirmative.

SPACECRAFT Okay. I think we already assumed this page one time, (garble). Okay, I'm going to start the power up there, Roy.

CAPCOM Okay, good Bob, we'll be watching. Well, I guess we won't, don't have any data until we hit Hawaii.

CAPCOM Columbia, Houston, we're about 30 seconds LOS, we'll see you at Hawaii at 35. We may pick you up for about a minute at Guam at 25.

SPACECRAFT Okay, we got it.

PAO This is Shuttle Control, Columbia is out of range at Yarragadee, next acquisition through Guam in 6 and a half minutes. Dr. Sam Pool, chief of the Medical Sciences Division at JSC, has issued a medical summary that we'll give you now. He reports that from the medical point of view, this mission has progressed pretty much as expected, generally good health, and excellent performance.

END OF TAPE

PAO Doctor Sam Pool, Chief of the Medical Sciences Division at JSC, has issued a medical summary that we'll give you now. He reports that from the medical point of view, this mission has progressed pretty much as expected, generally good health and excellent performance. Two of the crew have experienced some brief episodes of space sickness and have taken medications for space sickness. One of the crewmembers has completely adapted, adapted and has no more symptoms, one continues to have some symptoms. Dr. Pool will be available at the change of shift news conference. That conference currently scheduled for 8:50 a.m., central standard time. If that time changes, we will notify you on this loop as soon as a new time is known. Currently the change of shift is scheduled for 8:50 a.m., central standard time in the briefing room at JSC newscenter. Participants in that conference will be Flight Director Tommy Holloway and Dr. Sam Pool. At 2 days, 1 hours, 20 minutes, mission elapsed time, this is Shuttle Control, Houston.

PAO This is Shuttle Control at 2 days, 1 hour, 24 minute, mission elapsed time. Standing by for acquisition through Guam on the very end of orbit number 33. Orbit 34 will begin during the Guam pass.

CAPCOM Columbia, Houston with you at Guam for 1 minute, we have nothing to pass, we'll be standing by.

SPACECRAFT Yeah, I've got something. When we brought on the aft bay fans and the cabin fans, the redundant ones to get the load up, we got caution and warnings on them because of the high double Ps, and so we shut them off and I swapped out to get the 19 Kw, I've got the (garble) radar altimeter on, I think if you have the tact fan on, you wouldn't care if you had those other two on here. So those are on and that's what's giving me my 19 Kw right now.

CAPCOM Roger.

SPACECRAFT They also just turned on the food warmer to try and get it up a little bit.

CAPCOM Roger.

CAPCOM Columbia, we're going LOS, we'll see you at Hawaii at 3 5.

SPACECRAFT Yes sir.

PAO This is Shuttle Control, Guam has loss of signal, next acquisition through Hawaii in 8 minutes. At 2 days, 1 hour, 28 minutes, mission elapsed time, this is Shuttle Control, Houston.

PAO This is Mission Control, Houston, we're in acquisition at Hawaii tracking station on orbit 34. And brief dropout and we'll be stateside for a fairly complete pass across the stations in the Continental United States.

CAPCOM Columbia, this is Houston, with you for 8 minutes through the beautiful (garble) Islands.

SPACECRAFT Roger, thank you, Houston.

SPACECRAFT This is Columbia with you. And Houston, Bob's making some habitability comments on intercom Bravo.

CAPCOM Okay Joe, copy, ICOM B, do you know when he started them?

SPACECRAFT Oh, about 5 minutes ago, Bob, and he'll be at it for a few more minutes. They're there for later on when you want them.

CAPCOM Okay, we'll start looking on the tape then at about 1:31 or so, and we'll listen till it goes away.

SPACECRAFT Bob, he started them at 2, 2 days, 1 hour and 30 minutes, MET. I'm just worried that if you're dumping ICOM B now, can I continue recording on it?

CAPCOM Yeah Bob, you can go ahead and continue recording, we'll back it up on you OPS 1 recorder.

SPACECRAFT Okay, Bob.

CAPCOM Columbia, this is Houston, we're 20 seconds to LOS at Hawaii, Buckhorn will be next at 0145.

SPACECRAFT Hey, we also turned on some, I mentioned those caution warnings

END OF TAPE

CAPCOM Columbia, this is Houston. We're 20 seconds till LOS in Hawaii. Buckhorn will be next at 0145.

SPACECRAFT We also turn on some - I mentioned those caution warnings and I think we're going to (garble) the way on the caution and warning locator test and the fire suppression test for a little while. We'll catch up later today.

CAPCOM Okay, Bob. We copy that. That should be no problem.

PAO This is Mission Control Houston. Loss of Signal at Hawaii. About 1 minute away from the Buckhorn Station in California. Columbia crew now involved in the power reactant supply and distribution stratification test. That is testing of the cryogenic hydrogen and oxygen storage aboard Columbia. Part of the test involves loading everything you can onto the electrical power distribution system, the kitchen stove, the ports light, everything. To try to get the load up to in excess of 19 kilowatts. It's now showing a total of 19.16 kilowatts on all 3 fuel cells. The crew activity plan calls for that load to remain on the electrical system for approximately 3 hours. It's one of the detailed test objectives of the - this flight. We have data coming in from Buckhorn now for the next 8 minutes.

CAPCOM Columbia, this is Houston. With you through Buckhorn and Goldstone.

SPACECRAFT Roger, we copy Bob. Bob, I'm still recording on ICOM B, be another minute here.

CAPCOM Okay, Bob. Appreciate you letting us know when you get through cause we're running ops recorder 1 to track this stuff.

SPACECRAFT One more comment. That's all the -

CAPCOM Columbia, you we're kind of broken and short. Are you finished recording?

SPACECRAFT Yes, Bob. I'm all done right now and the last comments (garble) and the last comments, if you're trying to find it on tape (garble) G and we did have 1 interruption in the middle, whoever's going to listen to that, where we talked a few minutes - you got to listen all the way through it till you - the last thing I talked about is the hungees.

CAPCOM Okay, Bob. We copy.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead, Columbia.

SPACECRAFT Bob, did you ask Rita how many coffees with cream she put onboard. I can't find any.

CAPCOM Okay, we'll check with Rita.

SPACECRAFT It's all a plot. If the guys hid it on me, I can't find it.

CAPCOM And Bob, this lack of coffee with cream sounds like one of your major anomalies. We've got half the MOCR working on it right now.

SPACECRAFT I wish they'd found it you know. I think the guys hid them on me. I think that's what happened. We got coffee black and then coffee with cream and sugar and we got it all around but I don't have any coffee with cream. But that's all right, Bob, the tough will perservere.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go.

CAPCOM I have good news, Bob. Your coffee with cream. There should be 12 of them in holder wrap 2 in MF14H.

SPACECRAFT (garble) holder wrap 2. Well, I searched that this morning.

CAPCOM Columbia, this is Houston. We're 1 minute till a short LOS here about 1 minute between Buckhorn and Mila and the ascent and entry team is signing off turning you over to orbit guys. See you tomorrow.

SPACECRAFT Okay, thanks a lot, Bob. Be advised, I can't find holder wrap 2. I think they hid it on me.

CAPCOM I'm sorry, sir. We can't control what your crew does to you.

SPACECRAFT Well, I guess I'm lost, Joe.

CAPCOM And Columbia, Houston. The orbit team is with you now.

SPACECRAFT Gotcha.

CAPCOM We got about 6 minutes left here at the Mila pass.

SPACECRAFT Okay, Mike. Things are going well. We're in the middle of a meal.

SPACECRAFT Okay Mike, things are going well, we're in the middle of a meal.

CAPCOM Roger, we'll try to be quiet here, we got plenty of coffee down here, so we're all fine.

SPACECRAFT Well, you're doing better than me.

CAPCOM So, we understand.

SPACECRAFT Somewhere, somewhere in this Spacecraft is about 10 more coffees with cream.

CAPCOM Roger, maybe the sponge ate 'em.

SPACECRAFT That's what I was thinking. Well we still haven't found that one sponge package so maybe that's right. And Mike, if you don't mind, I'll amplify a little bit on that recording, the idea of my recording that habitability comments was to let you guys contact any of the habitability engineers that may be of interest, and maybe I generated a question or two, I tried to debrief everything I could think of, and there may be a question or two in their minds, basically everything else here is working real fine. (garble) pickie little things nothing major.

CAPCOM Roger Bob, we're anxious to listen to that, and we'll get back to you if we have any questions.

SPACECRAFT How's the weather in Houston today?

CAPCOM Roger, the weather here in Houston is a little bit cooler than it has been. About the low 50's right now, kind of clear outside.

SPACECRAFT Super. If you got any news, we're just sitting here trying to eat some BBQ Beef, we'd be happy to listen to anything that might be of interest.

CAPCOM Roger Bob, the big news down here is that the Space Shuttle successfully deployed a couple of satellites the last couple days.

SPACECRAFT Other than that.

SPACECRAFT Are we too early, or is there any further word on the transfers of those satellites?

CAPCOM Stand by on that one.

CAPCOM And Columbia, Houston, the apogee kick today on the SBS should come at about 10:20 MET this afternoon.

SPACECRAFT Okay, good show.

CAPCOM And you'll be glad to hear the SRB's are still floating, still being towed in to port, should be arriving sometime this afternoon.

SPACECRAFT Good.

SPACECRAFT You may be interested in what I'm doing Mike, you really feel like when you're eating you like to get your whole body in a restrain like your head and shoulders and everything, I've got my feet up on about the fourth step of a ladder and my neck jammed against the bulkhead right above ML31C it makes a perfect place, and I'm sitting here eating my BBQ beef and kind of a picnic.

CAPCOM Okay, we copy. We'll have to take your word that that's comfortable.

SPACECRAFT It's the first time we all agree that Bob's showing restraint when he eats.

CAPCOM Roger, we copy that.

CAPCOM And Columbia, Houston we're 40 seconds from LOS, we'll talk to you through Ascension at 2 plus 15, and Bob gave us a good idea on a BBQ, we're getting our orders together for Petey's this afternoon.

SPACECRAFT Okay, well I tell ya, what we got is awful good up here.

CAPCOM Roger, we'll pass that along to Rita.

SPACECRAFT These guys that say you lose your appetite in space are not chow hounds like me I can tell you that.

CAPCOM I can believe that Bob.

SPACECRAFT I rest my case.

PAO This is Mission Control Houston, loss of signal through the Merritt Island launch area tracking station. About 12 minutes away from reacquisition at Ascension Island. The crew currently in the noon meal. Bob Overmyer having some difficulty locating the pouches of coffee with cream. Claims that it's a conspiracy by his shipmates to hide his coffee and cream. He did make the comment.....

END OF TAPE

PAOclaims that there's a conspiracy by his shipmates to hide his coffee and cream. He did make the comment that the the food onboard is very good. Speaking as what he described as an old chow hound, and he wanted the CAPCOM to pass along our thanks to Rita, meaning Rita Rapp who is the JSC nutritionist in the food lab. Acquisition through Ascension in 11 minutes away, at day 2, 2 hours 4 minutes, Mission Control Houston.

PAO Mission Control Houston, Columbia's now been acquired by the Ascension Island tracking station for the next 6 minutes.

CAPCOM Columbia, Houston, we're standing by through Ascension for 6 and 1/2 minutes.

SPACECRAFT Roger Brian, we copy.

CAPCOM And Columbia, Houston, we're 30 seconds from LOS, we'll talk to you through Botswana at 2 plus 26.

SPACECRAFT Okay Mike.

PAO This is Mission Control Houston, loss of signal at Ascension, 3 minutes away from reacquisition through Botswana, voice relay station in South Africa. Off going Flight Director Tommy Holloway is scheduled to have his change of shift press conference at 8:40 CST in the JSC newscenter. He will be accompanied by Chief Flight Surgeon Dr. Sam Pool. The Flight Director is now leaving the control center, headed toward Bldg. 2. Two minutes away from reacquisition at Botswana.

CAPCOM Columbia, Houston, we're standing by through Botswana for 7 and 1/2 minutes.

SPACECRAFT Roger.

SPACECRAFT And Mike, you got any other suggestions of anything we can turn on to get the loads up, I noticed, I guess (garble) down to 19KW, anything else we can get on, we don't want to turn those fans that we had on because they'd given (garble) alarms.

CAPCOM Okay, we'll take a look at that.

SPACECRAFT Mike, we're getting set up for the glow experiment. There's quite a lot of gear to assemble, and we're getting that ready. As we ride along here on primary thrusters, if you brace yourself against the orbiter and a thruster fires, you can feel the orbiter vibrate long after the thrusters gone off, I'd guess 3 or 4 seconds, and it seemed to vibrate about 3 or 4 hertz vibration, that's most interesting.

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CAPCOM Okay Joe, that's from primary thrusters, thank
you.

SPACECRAFT Mike, while we're just eating and getting ready
here, I just can't say how much that long sim helped us prepare
for this. With the exception of the floating back and forth,
instead of walking, I feel like I've been through all this
before.

CAPCOM Roger Bob, we sure agree with

END OF TAPE

SPACECRAFT well, we're just eating and getting ready here. I just can't say how much that long SIM helped us prepare for this. With the exception of floating back and forth, instead of walking. I feel like I've been through all this before.

CAPCOM Roger, Bob, we sure agree with that.

SPACECRAFT Amazing how everything is just, everything is operating just like it did in the long SIM. Except here's better by 12 orders of magnitude.

CAPCOM Thank you, Joe, I wish we were all up there to see it.

SPACECRAFT I wish you were too, Michael.

SPACECRAFT We'll get our head together on this thing. But I tell you, I think there's room for a few more anytime. When we're up here and just think, four of us are having no problems at all.

CAPCOM Okay, that's good to hear.

SPACECRAFT The times it gets crowded is when there's something big in the aft window, or else up in the top windows, and all four want to look at the same time.

CAPCOM Roger, Bob, and we'd like to leave the loads right where they are, things are looking good.

SPACECRAFT Okay, I'm sorry I can't get up to 19, but those fans were tripping the caution warning, that was just very annoying.

CAPCOM And Columbia, Houston, Bob, when the circ pumps come on, that pushes the loads way up there, and the average is about where we'd like.

SPACECRAFT Okay.

CAPCOM And Columbia, Houston we're 30 seconds from LOS, we'll talk to you through Yarragadee at 2 + 4 9.

SPACECRAFT Michael.

CAPCOM Columbia, Houston with you through Yarragadee for 1 minute, over.

SPACECRAFT Okay, Mike, we copy.

CAPCOM Got you loud and clear.

CAPCOM And Columbia, Houston, we're going LOS in 15 seconds, we'll talk to you through Guam in 2 + 5 8.

SPACECRAFT Okay.

PAO Mission Control, Houston, 30 seconds away from acquisition of Columbia through Guam for a fairly lengthy pass. Standing by for data and voice.

CAPCOM Columbia, Houston with you through Guam for 8 minutes.

SPACECRAFT Roger, Houston, this is Columbia.

CAPCOM Roger, Joe, we read you loud and clear.

CAPCOM Columbia, Houston, we're 30 seconds to LOS, and we'll talk to you through Hawaii at 3 + 12, and a reminder you've got a PMC scheduled at Hawaii.

SPACECRAFT Roger, we are aware of that, and we'll be seeing in Hawaii.

CAPCOM Roger.

PAO This is Mission Control, Houston. Loss of signal at Guam, Hawaii coming up in 5 minutes. At which is scheduled in the flight plan, a private medical conversation with the flight surgeon. So we may or may not have any live air/ground at that pass. Day 2, 3 hours, 6 minutes, Mission Control, Houston.

CAPCOM And Columbia, Houston, we've got you about a minute and a half through Hawaii here.

SPACECRAFT Okay, we're starting to set up for the VRCS test. I just want to confirm that the minus pitch is to last for 2 minutes and 5 seconds.

CAPCOM Roger, we confirm that, it's 2 minutes and 5 seconds at minus pitch.

SPACECRAFT Thank you.

CAPCOM And Columbia, Houston, we're 30 seconds for a short LOS here. We'll talk to you through the states at 3 + 2 1.

SPACECRAFT Okay, see you then.

CAPCOM Columbia, Houston with you through Buckhorn for 7 and a half minutes, over.

SPACECRAFT Roger, understand.

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CAPCOM We've got a couple of notes for you, when you got a chance.

SPACECRAFT Okay, we're set. We're burning the burniers now, or the vernier.

CAPCOM Roger, we see that, and we

END OF TAPE

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SPACECRAFT We're burning the burniers now, or the vernier.

CAPCOM Roger, we see that, and we're going to LOS for about 4 minutes, call you through Mila.

SPACECRAFT Rog.

CAPCOM Columbia, Houston, we're with you through Mila for 3 minutes.

SPACECRAFT Roger, Houston, and the vernier test is complete.

CAPCOM We copy that.

CAPCOM Columbia, Houston, we're 30 seconds to LOS, we'll talk to you through Ascension in 3 + 5 2.

SPACECRAFT Okay, see you there.

PAO This is Mission Control, Houston. Loss of signal through Merritt Island launch area, key tracking station, on orbit 35. Ascension Island, next station in 16 minutes, at which time the crew will begin powerdown of the performance measurements of the power generating system aboard Columbia. Currently still drawing about 19.9 kilowats as practically every electrical appliance and system aboard the spacecraft is turned on to add a load to the system. We'll return in 15 minutes, this is Mission Control, Houston.

PAO This is Mission Control. Columbia now acquired by the Ascension Island tracking statin on orbit 35.

CAPCOM Columbia, Houston with you through Ascension for 4 minutes.

SPACECRAFT Okay, Houston, loud and clear. We completed the radiator deploy early. They were out at 3 hours, 48 minutes, 30 seconds.

CAPCOM Okay, we copy that Vance. We got a few notes for you when you have a chance.

SPACECRAFT We have a chance.

CAPCOM Roger, reference to glow experiment, just for your information. The terminator will be about a half a minute later than is indicated in the CAP. And we'd like you to top off the water tank C and D by taking the supply water tank Bravo inlet valve to close on panel R12, plan to leave it closed for approximately 1 hour, we'll give you a call when to reopen it. We're going to go ahead and top off tank C and D from 90 to about 95.

SPACECRAFT Okay, Mike, it's closed tank Bravo inlet, closed, and this time talkback close.

CAPCOM Roger, Bob, a note here on water inspection under the middeck floor. When you get a chance, we'd like you to go down there and look under some panels and referencing the IFM checklist page 2-6, we'd like for you to check for moisture underneath the following panels: MD23R, MD80R, two closeout panels, and MD52M, and MD54G, that's the lioh door there, and the slipper access panel at location MD20 India, and if you'd look under those and look at the waste water tanks, and the sluper there and report any moisture. Go ahead and mop it up, appreciate it.

SPACECRAFT Okay, I got all the panels, but the second one you read there, Mike. My led broke just as I went to write it.

CAPCOM Okay, the second one was MD80R, that's eighty R.

SPACECRAFT Okay, Mike delta eight zero Romeo I got it.

SPACECRAFT And Mike, the radiator deploy times were nominal, latch deploy, unlatch deploy.

CAPCOM Okay, Vance we got that.

CAPCOM And Columbia, Houston, we're 3 seconds from LOS, we'll talk to you through Botswana at 4 + 0 2.

SPACECRAFT Roger, see you there.

PAO This is Mission Control, Houston, 30 seconds away now from reacquisition of Columbia through the Botswana, South Africa voice relay station.

END OF TAPE

PAO This is Mission Control Houston, 30 seconds away now from reacquisition of Columbia through the Botswana South Africa voice relay station. After the powerdown in the power generation system test, the kilowatt usage for Columbia is now down to 16 kw.

CAPCOM Columbia, Houston with you through Botswana for 7 minutes.

SPACECRAFT Okay, loud and clear Mike.

CAPCOM Got you loud and clear Vance, and I know your getting ready for the glow experiment, the last time we had data here we saw both fans on still on Av Bay 1 and 2 from the PRSD experiment, we'd like to have you turn A off on Av Bay 1 and have B off on Av Bay 2 please.

SPACECRAFT Okay Mike, and we're starting the maneuver 30 seconds later so for what you said, so that will be at 4 hours 6 minutes and 30 seconds.

CAPCOM Okay Vance, we copy that. One other item of information for you. The cabin 02 message that you got a while ago was caused by the switch over from system 2 to 1, and system 1 regs a little bit higher than systems' 2 and so the reg tried to make it up all at one time.

SPACECRAFT Okay, yes we noticed it. We thought maybe it was normal, so we didn't say much.

CAPCOM Right, you can ignore that.

SPACECRAFT Mike, just a question, did anybody make anything out of that, were you able to retrieve ICOM B on my report to you there?

CAPCOM That's affirmative Bob, it came across real well, and the right people are listening to it now.

SPACECRAFT Super.

SPACECRAFT Tell Dan Germany he does good work.

CAPCOM Okay, we'll pass that along.

SPACECRAFT Maneuver's starting.

CAPCOM Roger, copy.

SPACECRAFT And Houston, the sun's rolling right over the top of us.

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CAPCOM Okay Joe, sounds like it's working right.

SPACECRAFT And the roll rate is .489 if that sounds good to you. We do have a little pitch and yaw but I won't touch that, it's .028, pitch rate and .078 yaw rate.

CAPCOM Okay Vance, we got those numbers.

SPACECRAFT And Mike. (garble) before, it really heats up the aft flight deck.

CAPCOM Okay Joe, understand it heats up the aft flight deck.

CAPCOM And Columbia, Houston we're 30 seconds to LOS, we'll talk to you through Guam at 4 plus 34.

SPACECRAFT See you there.

END OF TAPE

CAPCOM And Columbia, Houston, we're 30 seconds till LOS. We'll talk to you through Guam at 4 + 34.

SPACECRAFT See you then.

PAO This is Mission Control Houston. Loss of Signal at Botswana, South Africa. Voice relay station for Shuttle missions. Next station is Guam in about 23 minutes. Crew currently conducting the glow affect experiment performed the maneuver connected with that at day 2, 4 hours 10 minutes Mission Control Houston.

PAO Mission Control Houston. We have acquisition of Guam at this time. On the outset of orbit number 36.

CAPCOM Columbia, Houston. We're with you through Guam for 8 minutes.

SPACECRAFT Okay, roger Houston. And we're in the middle of the glove experiment.

CAPCOM Houston, roger.

SPACECRAFT And Houston, please make a note for the experiments (garble) on the first photo sequence the 35 millimeter on the last sequence taken of 41 and 1 quarter seconds. They were reversed order, reversed in order.

CAPCOM Okay, Joe. We got that thank you.

SPACECRAFT And another comment, although I know the attitude rap does not matter to much. The air from the original attitude after the end of the roll is about roll sending minus 72 pitch minus 8, and yaw minus 78 degrees.

CAPCOM Okay, Vance, we got those numbers.

SPACECRAFT And Houston, Columbia.

CAPCOM Go ahead Vance.

SPACECRAFT Roger. Based on your call, we started the maneuver at 4 hours 6 minutes 30 seconds and we observed spacecraft sunset exactly at 4 hours 11 minutes and that's how we started our elapsed timer and we're basing photos on that.

CAPCOM Roger, we understand. Columbia, Houston. We're 30 seconds from LOS. We'll talk to you through Hawaii at 4 + 48.

SPACECRAFT Okay, Mike. We'll see you over Hawaii. And Mike, just a note, the VTR is running and we're looking through cameras Charlie and Delta, and according to the monitors, their not

picking up any glow at all. Of course, it could be a lower level and it might be going onto the tape, but there's no obvious indication that we're seeing it in the TV.

CAPCOM Okay, we understand.

PAO This is Mission Control Houston. Loss of Signal in Guam. Five minutes across the Pacific to reacquisition at Hawaii. About 1/4 the way through orbit number 36 the crew currently running the glow experiment which in the test objectives list is called investigation of STS atmospheric luminosity. In this particular investigation the crew will be using or is using combination of television camera and video tape recorder. 70 millimeter Hassleblad cameras and 35 millimeter nikon cameras to attempt to capture what appears to be something like a space version of St. Almos fire, where the orbiter, some orbiter surfaces glow in the dark. The nikon has an image intensifier and which hopefully will boost the effective film speed to get some evidence of the glow. Joe Allen just reported that LOS in Guam near LOS Guam that there was no joy in getting any kind of image on the video tapes. 3 minutes now away from reacquisition through Hawaii. At day 2, 4 hours 44 minutes Mission Control Houston.

END OF TAPE

PAO ... video tape. Three minutes now away from reacquisition through Hawaii. At day 2, 4 hours 44 minutes Mission Control Houston.

PAO Mission Control Houston. We have acquisition through Hawaii at this time.

SPACECRAFT And Houston, you still there?

CAPCOM And Columbia, Houston. We're just coming over the hill here at Hawaii. We'll be with you for 8 minutes now go ahead.

SPACECRAFT Roger. We're finished with the experiment maneuvering back to starboard sun.

CAPCOM Roger.

SPACECRAFT Houston Columbia.

CAPCOM Go ahead.

SPACECRAFT Mike, we sort of intentionally put off 2 spacecrafts gas on page 4-41 on the cap but 145 the annunciator caution and warning lamp test and fire smoke so I'm going to do those now. You, if you see them happening you'll know.

CAPCOM Okay, thanks for the warning.

CAPCOM And Columbia, Houston. Tanks C and D are full now. You can reopen supply bravo inlet valve R12.

SPACECRAFT Okay, in work.

CAPCOM And Columbia, Houston, we're about 50 seconds from LOS. We'll talk to you through Buckhorn again in about 3 minutes and Bob, slinger 1 down here Dan Germany and he would like to tell you thank you for the comments on WCS.

SPACECRAFT Okay, Bob's, temporarily indisposed. We'll pass that on to him.

CAPCOM Roger.

SPACECRAFT He's continuing the testing and Dan deserves the the compliment.

CAPCOM Roger, that.

CAPCOM And Columbia, Houston. We're with you through Buckhorn for 3 1/2 minutes.

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SPACECRAFT Roger, Houston. And the note on the fire/smoke detector suppression test, we have 1 light that does not light up. That's system A on bay 3. All the other light are okay.

CAPCOM Roger, we copy. System A av bay 3 light. Columbia, Houston. We're 30 seconds from a long LOS. We'll talk to you again at Botswana at 5 + 38.

SPACECRAFT Okay, see you 5 + 38.

PAO Mission Control Houston. Loss of Signal through Buckhorn. 34 minutes away from reacquisition through Ascension Island. The crew has completed the glow experiment and has maneuvered back to the nominal starboard to sun attitude. The fire/smoke detection test and the caution and warning lamp test had been delayed from a couple of hours ago has been completed. We'll return at Ascension Island in 34 minutes, Mission Control Houston.

CAPCOM Columbia, Houston. With you through Botswana for 7 minutes, over.

SPACECRAFT Okay, we copy and we got some words for you on my water search.

CAPCOM Okay, go ahead, Bob.

SPACECRAFT Well, basically the only place I saw any water underneath here at all was around the Y duct into the heat exchanger and that's under that access panel you just get into it real easy, and there's a couple of joints that don't have proper or don't have sufficient insulation on them and they both had a lot of water all around them. Well, I wouldn't say a lot they were just covered with a layer of water all around the joint. I suspect that water is migrating over there and coming up around the cryo canisters, at least that's my first guess. Looking back as far as I could toward the tanks, I could see no water under the tank Charlie or Delta. I really couldn't see much water anywhere else except on the ...

END OF TAPE

SPACECRAFT Looking back as far as I could toward the tanks. I could see no water under the tank Charlie or Delta. I really couldn't see much water anywhere else except on the starboard side of the lioh canister box looking down through the air vent screen. There was some water on the wiring down in that area just a little bit. Again, I suspect all from the - well I don't know where it's from, but it doesn't look like there is a massive leak of water going on or anything like that.

CAPCOM Okay, we copied all that, Bob. That sounds like good news.

CAPCOM And Columbia, Houston. If you get a free moment, we'd like to get you to amplify on this CRT 2 failure, how it looked at prior to going blank if you saw any distortion of the text when it was shifted.

SPACECRAFT Okay. If you could draw a line vertically on the on the CRT right down the middle, right horizontally right down the middle and make it into equal quadrants. The CRT 2 did a shift and the next scene that was up was what would normally be on the upper right quadrant of the any screene. In other words, the CRT timer and the MET times, the center in the lower left quadrant for the upper left quadrant, the upper right quadrant and lower right quadrant were blank. And the lower left quadrant had information in it which would normally be up in the upper right quadrant. And it stayed that way for quite awhile. We powered cycled it and it came back, (garble) tried to go SM on it and then it died. Does that make any sense to you there, Mike?

CAPCOM Roger, could you tell us the text that you could see. The timers and so forth were they distorted or were the text numbers clear?

SPACECRAFT It was absolutely clear, Mike. You could read the CRT time and then in particular I had sent someone upon there for awhile on the SM. I take that back. I had - you could see from the universal pointing, you could see the last half of the PTG, you could see all the numbers counting, right? And you could see the current future and the asterisk on the track and the row of (garble) inspect items 18, 19, 20, and 21 were on there. Just set that bottom left quadrant perfectly and the other three quadrants were empty.

CAPCOM Okay, Bob. That's a good explanation. It really helps us out. It sounds like a DEU failure then.

SPACECRAFT Okay, sounds like a DEU, huh?

CAPCOM Roger. That's - we were able to duplicate that down here so that really helps.

SPACECRAFT Is that right? Super. Looks to me like just a matter of getting behind that screen over there and swapping the - swapping the cables. Is that correct?

CAPCOM Standby a second, Bob. We're discussing it. And Columbia, Houston. Bob, we concur with that. It sounds like we'll be able to swap cables there with 2 and 4 - should fix the problem. Get back to you on that.

SPACECRAFT Okay, we're not planning on that till day 5 I don't believe.

CAPCOM That's affirmative. And Columbia, Houston. We're going to go through a short LOS here for about a minute and we'll talk to you through IOS.

SPACECRAFT Okay, Mike.

CAPCOM And Columbia, Houston. We're back with you through IOS for 7 minutes.

SPACECRAFT Okay, Mike. How you read us, Mike?

CAPCOM Go ahead.

SPACECRAFT How you read us?

CAPCOM Okay, we got you loud a little bit garble.

SPACECRAFT And that my friend is a treadmill.

CAPCOM Okay, we copy the treadmill. And Columbia, Houston. We're 30 seconds to IOS. We'll talk to you again through Guam at 6 +12. Our bar-b-que sandwich just arrived, Bob, so we're going to have those now.

SPACECRAFT Okay, Houston we copy. You should have seen this scene. Vance set indoor record for speed and heart rate up to about 140 on the treadmill. Looked to me like he was going about 50 miles an hour and everytime he'd (garble) he'd splatter up tiny tiny little droplets of water so it's like being in a small rain shower on the middeck now.

CAPCOM Roger, we copy. Joe, sounds like a good workout.

SPACECRAFT (garble).

END OF TAPE

PAO This is Mission Control, Houston, loss of signal at Indian Ocean station, on orbit 37, 36, nearing the end of 36. We're some 15 minutes away from reacquisition at Guam, coming up on the noon meal period, and as the capcom mentioned, some of the people here in the control room are munching out on barbeque sandwiches brought in from outside. We'll return in 15 minutes, at Guam, this is Mission Control, Houston.

CAPCOM Columbia, Houston with you through Guam for 5 minutes, over.

SPACECRAFT Okay, Houston, got some bad news for the RMU guys. We're going to have to use the alternate, the screw head on the bottom of the rudder for the target. The band shield's closed, you can see target 3 when you put your head at the very top of our aft windows, but the theodolite doesn't come up high enough and it just looks at the top of the PAM. So when I do the theodolite (garble) after bit, I'm going to have to use the alternate screw.

CAPCOM Okay, Bob, we concur, that's a good thing to do.

SPACECRAFT I don't know if it's a good thing to do, it's the only thing we can do, I think.

CAPCOM Roger.

SPACECRAFT And we seem to have misplaced the theodolite cue card, but since the readings on it, we're all based on that number 3. Anyway, I guess I won't use that anyways, so essentially starting all over again.

CAPCOM Roger.

SPACECRAFT And Mike, just so you won't be concerned, I just happen to have some time to do this, went ahead and set it up and look through. I don't think those readings are on the proper time now.

CAPCOM Okay, we copy, Bob.

SPACECRAFT We're going on a giant cue card, now, Mike.

CAPCOM Roger, Bob. As a reminder, the theodolite target pad is also in the Orbit OPS checklist on page FS4-3.

SPACECRAFT I've got that, but that doesn't have the zero readings in it from the 5 A plan, does it?

CAPCOM Standby.

SPACECRAFT Just right now, when I said it won't make any difference anyway if we're using the screw, those were taken off of number 3.

CAPCOM And Columbia, Houston, Bob, we'd just like you to go ahead and zero in on the screw and record that data. And we'd like, in order to preclude any possibility of another CRT failure, we'd like to avoid cycling CRT power to create a message down here when we anitate voice recorders. We'll figure out some other way to tell you to do that here. We're planning over Hawaii to read up a few news items for you during your meal, if that's okay?

SPACECRAFT Okay, super idea, and we'll stop the CRT power.

SPACECRAFT How about for tonight, we can turn them on very dim, if you want us to, instead of turning them off over the night hour.

CAPCOM Roger, we'll get back to you on that one. And we're going LOS here in about 10 seconds. We'll talk to you through Hawaii at 6 + 2 4.

PAO This is Mission Control, Houston, loss of signal at Guam, 6 minutes away from reacquisition through Hawaii on orbit 37. Comment there that in doing some theodolite measurements of the payload bay door hinge line, latch locations, they could not see the index mark, which was really a screw head at the aft bulkhead, because of interference by the covers for the now deployed satellites. So they're moving to an alternate index mark that is in view. Return in 6 minutes for Hawaii during which the capcom will read up a brief news summary to the crew, world news. This is Mission Control at day 2, 6 hours, 18 minutes.

END OF TAPE

PAO During which the CAPCOM will read up the news summary to the crew and the world news. This is Mission Control at day 2, 6 hours 18 minutes.

PAO This is Mission Control Houston, some 30 seconds away from acquisition through Hawaii. Crew now in their meal period. Their noon meal scheduled period in the flight plan. Should have acquisition any moment now and we're standing by.

CAPCOM Columbia, Houston with you through Hawaii for 8 minutes, over.

SPACECRAFT Yeah, go ahead.

CAPCOM Roger, hope you guys are enjoying your meal here, and we've got some news to read up, if your ready to listen.

SPACECRAFT Stand by, let's get Vance on COMM, he's been off COMM a minute.

CAPCOM Okay.

SPACECRAFT Actually, we're not eating, we managed to get ourselves just enough behind that sequence in the glow and that, and we just got ourselves a little bit behind. We'll be eating a little later I guess.

CAPCOM Okay, we understand.

SPACECRAFT Okay Mike, go ahead.

CAPCOM Okay, our PAO friends have supplied us with some wire service news here. I'll read it off if you're all ready to listen. The biggest news is the new secretary of the Communist Party, General Secretary of the Communists Party, is Yuri Androphov was elected Friday to succeed Leonard Brezhnev. He was a former secret police chief. He assumed the general secretaryship of the Communist Party in an unusually swift transition of power. Only two days after Brezhnev suffered a fatal heart attack. The Polish Interior ministry announced that (garble) was freed today from the remote government lodge where he spent much of the last eleven months in detention, and his whereabouts are still a mystery though. The wife (garble) has not seen him yet. America's Vietnam veterans are marching down Constitution avenue today, giving themselves the welcome home parade, the nation (garble) Vietnam war ended. After the march the veterans will dedicate the Vietnam veterans monument built by the veterans, in honor of the veterans. In Washington, President Reagan is ready to announce a brand new East West trade agreement with the European allies, a lifting of U.S. trade sanctions against the Soviet Union. That were imposed after the military crack down in Poland. And locally, 270,000 persons have called

the special telephone company 900 number to listen in on the shuttle air to ground communications. In sports a group of at least a dozen national football league players, including the Greg Bigam and Carter Hartwig from the Oilers will confront Ed Garvey today in what the players consider a last ditch effort to save the 1982 NFL season. The Houston Rockets continue their perfect season, by losing to the Los Angeles Lakers 127 to 96, so they are 0 for 7 now. And, we'll get you football scores as soon as they start coming in today. A couple of the big games, Texas A&M plays Arkansas and Penn State plays Notre Dame. We'll get you those when we can.

SPACECRAFT Okay Mike, sure appreciate that, that was great.

CAPCOM And Columbia, Houston, the SBS data looks very good to us down here. You can switch over to ANIK whenever you like.

SPACECRAFT Okay, Michael we copy that, I had given you 5 minutes of ANIK just prior to the SBS, look the other direction on the tape if you don't find it, I'll switch over to ANIK right now.

CAPCOM Okay, we copy Joe, we thought you were just waiting for a comment there.

SPACECRAFT No, and I'm about to end the SBS data tank right at the moment.

CAPCOM Roger, that's fine Joe, thank you.

SPACECRAFT And Mike, I've got a request for tomorrow.

CAPCOM Go ahead Joe.

END OF TAPE

SPACECRAFT And Mike, I've got a request for tomorrow.

CAPCOM Go ahead Joe.

SPACECRAFT Roger, there's a third, a very famous football game to be played tomorrow, the De-Paul/Wabash game, and I'd like that score passed up to me.

CAPCOM Roger Joe, we've already done the ground work on that, and we'll get you that one as soon as we can.

SPACECRAFT Okay.

CAPCOM And you might pass along to Bill here, we know there's a De-Paul game and a Baldwin/Wallace game and a Colorado game, we haven't been able to find where MIT is playing today.

SPACECRAFT Thanks.

SPACECRAFT He won't come home without them Mike.

CAPCOM And, Columbia Houston, we're 30 seconds from LOS, we'll talk to you again through Santiago at 6 plus 54.

SPACECRAFT Roger that, is that going to a PMC?

CAPCOM Negative, hadn't planned on it there.

SPACECRAFT Okay.

PAO This is Mission Control Houston, loss of signal at Hawaii. Santiago in 21 minutes, extremely low elevation angle pass. Only 48 seconds duration, unlikely there will be any COMM at Santiago. Botswana in 40 minutes, a 5 minute 17 second pass. The crew currently preparing for their scheduled noon meal. At day 2, 6 hours 33 minutes, Mission Control, Houston.

CAPCOM And Columbia, Houston with you for about 20 seconds through Santiago.

SPACECRAFT Alright Mike, we copy.

CAPCOM And we'll give you another call at Botswana at 7 plus 14.

SPACECRAFT Like to just say thanks again for all that news, we appreciate it.

CAPCOM Roger Bob.

CAPCOM Columbia, Houston with you through Botswana for 5 minutes, over.

SPACECRAFT Roger Mike.

CAPCOM Got you loud and clear.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead Vance.

SPACECRAFT Mike, since I talked to you last, I've had a little bit of wireless COMM problem, unit A seems to have failed, unit E I put up to replace it, and I can't seem to get it to work. Right now, I'm on unit D, which belongs to Joe. I'm going to plug in HIU into the wall unit on the CDR's side, see if I can make that work. It appears that it might be something behind the wall as opposed to a wireless unit.

CAPCOM Okay, we understand.

CAPCOM And Columbia, Houston, Vance you might want to check the circuit breaker that popped before on panel R15, row F they sent you 1 BC audio left circuit breaker, make sure it's still in.

SPACECRAFT Okay, I'll check that.

CAPCOM Columbia, Houston, while you're back there, we'd like to get a caution warning memory clear on panel R13. And a water dump tonight, we'd like to dump tank Bravo to 10 percent.

SPACECRAFT Tank bravo to 10 percent.

CAPCOM Roger Vance, and when you get a chance, we'd like to hear the report on the cabin temperature last night, during your sleep period.

SPACECRAFT Did you copy that?

CAPCOM That's a negative Bob.

SPACECRAFT Circuit breaker is popped, are we clear to put it back in?

CAPCOM Columbia, Houston, we're about 30 seconds from LOS here, why don't you wait until we get some data over IOS, we'll talk to you over Indian Ocean at 7 plus 22.

SPACECRAFT Okay Mike.

CAPCOM Columbia, Houston with you through IOS for 9 minutes, over.

CAPCOM Columbia, Houston with you through IOS for 9 minutes, over.

SPACECRAFT Okay, copy, Mike.

SPACECRAFT Mike, say that parameter you want reset on caution/warning.

CAPCOM Roger, Bob, we'd just like a caution/warning memory clear on panel R13, please.

SPACECRAFT Okay, that's easy enough.

CAPCOM And we didn't copy your transmission, I think you were talking about the sleep period last night, the cabin temperature.

SPACECRAFT Standby.

CAPCOM And Columbia, Houston, Bob, if you're still back there on R13, we'd like to verify that the parameters 14 and 54 are still uninhibited, please.

SPACECRAFT Standby.

SPACECRAFT That's affirmative, Mike, 14 and 54 are inhibited.

CAPCOM Okay, we understand and we'd also like to get a report here on the cabin temperature last night during the sleep when you have a chance.

SPACECRAFT Mike, did you copy Vance there, the temperature was pretty good last night, we'll probably leave it on full hot tonight, for tonight.

CAPCOM Okay, we copied you, Bob, temperature was good last night and you plan to leave it on full hot tonight.

SPACECRAFT Affirm.

SPACECRAFT How do you read, now Mike.

CAPCOM Okay, Vance I got you loud and clear, now.

SPACECRAFT Now Mike, we completed an alignment, would you like the numbers?

CAPCOM That's a negative, we've already got them down here, thank you.

SPACECRAFT Okay, very good.

CAPCOM And Columbia, Houston, we'd like to get a time hack on when you first noticed you weren't getting comm over that DTU there, over the wireless comm, go back and look at a current spike there.

SPACECRAFT That's a little hard to say, Mike. I first noticed it on intercom, and I suppose I've been working with it for 45 minutes.

CAPCOM Okay, copy.

SPACECRAFT It was about the time you were reading us the news, Mike, maybe just a little bit before that.

CAPCOM Okay, that pins it down, thank you.

CAPCOM And Columbia, Houston, regarding a com problem, we'd like you to go to the OS panel on A11 and setup your wireless unit as you were on panel O5. Set it the same way, except for the speaker power being off. We can read off the positions, if you'd like.

SPACECRAFT Okay, set it up on OS on the middeck, is that right?

CAPCOM We'd like you to setup on A13, panel A13, the OS audio panel, as you had your (garble) audio panel on O5, except for the speaker power being off.

CAPCOM And Columbia, Houston, we're 30 from LOS, we'll talk to you through Guam at 7 + 5 0.

PAO This is Mission Control, Houston. Loss of signal at Indian Ocean station, 18 minutes to reacquisition at Guam. Some problems with the wireless microphone system aboard the spacecraft, they're attempting now to sort that out by switching the wall units to different panels in which they are plugged around the spacecraft. Some current numbers on Columbia's orbit, 160.3 nautical miles at perigee by 169.2 nautical at apogee. Period is 1 hour, 30 minutes, 47 seconds

END OF TAPE

PAO on Columbia's orbit 160.3 nautical miles at perigee by 169.2 nautical at apogee. Period is 1 hour, 30 minutes, 47 seconds. 17 minutes plus to reacquisition through Guam. This is Mission Control.

CAPCOM Columbia, Houston with you through Guam for 3 minutes, over.

SPACECRAFT Roger, Houston, go ahead.

CAPCOM Roger, Bob, we're going to loose you briefly through a keyhole here, in while, we'd like you to, on panel L1 turn both the humidity separators on please, SEP A on as well, trying to reduce the condensation.

SPACECRAFT Okay, both humidity seps on, roq.

CAPCOM And Columbia, Vance is plugged into 813 now, or All, we'd like to find out which WCCU unit he's using, did he go back to A or E or what?

SPACECRAFT He's hearing you right now Mike, and we're pretty busy right now. Let me get the SEPs on.

CAPCOM Roger.

SPACECRAFT Okay Mike, humidity SEP A is now on also.

CAPCOM Roger, we see that, thank you.

CAPCOM And Columbia, Houston, with about 40 seconds to go in this pass, we'll see you at Hawaii at 8 + 0 0, we're looking forward to television.

SPACECRAFT Okay, and we're dumping water to 10 percent tank Bravo, right?

CAPCOM That's affirmative.

SPACECRAFT And Mike, we've started the equipment prep on the EVA and I have completed almost the entire left column of 1-2, and bits and pieces of the one on the right column.

CAPCOM Roger, we copy.

PAO Mission Control, Houston, loss of signal at Guam, 6 minutes to Hawaii. Mission Specialist Bill Lenoir, reported that he was well into the checklist for EVA equipment preparation for tomorrow's spacewalk. We'll return in 5 minutes for that Hawaii pass, in which we should get some television of EVA equipment preparation. This is Mission Control, day 2, 7 hours, 54 minutes.

PAO This is Mission Control, we have acquisition at Hawaii at this time, about 50 seconds early.

CAPCOM And Columbia, Houston, we're with you through Hawaii for 8 minutes, and we've got a good TV picture down here.

SPACECRAFT Roger, Houston, we have a picture of the Earth in back of the spacecraft here for you. At the moment, we have water dump in progress which around sunset is very spectacular, I don't know if you can see anything now or not.

CAPCOM We can't

SPACECRAFT We'll move the camera over a little bit closer to where the dump is incase you can't see it. Right now, up on the flight deck, we have Bob working with the theotlelite, he's taking some measurements looking into a, part of a (garble) type device. Bob you might step down a second and say high to everybody. He's really trying to determine if in this position, with respect to the sun, we're getting any distortion of the spacecraft. And I don't think he knows yet, but he's getting the numbers. Also, we have Bill and Joe downstairs getting ready for the EVA. Before we go to them though, I'd like to sort of mention something.

END OF TAPE

SPACECRAFT (garble) also, we have Bill and Joe downstairs getting ready for the EVA. Before we go to them though, I'd like to sort of mention something. We have here something that commemorates the bicennetial of flight, now about 200 years ago, specifically in 1783 the Montgolfier brothers in France were flying the first balloon, and since then of course we've come a long way. And not only in France and America, but around the world, so this is a big thing to commemorate, and we think it's especially appropriate to mention it while we're up here travelling about a 160 miles above the earth at 17000 miles a hour to show what man's progress has been. President Reagan and French President (garble) are both co-chairman of this celebration this year. Going on with what were doing here now, we might give you a picture of the middeck there, you can see Bill and Joe preparing for tomorrow's activity with the EVA, there is quite a bit to be done. We see a hatch opened and the hatch is right now the passage way into the airlock system, where gear is being taken to prepare the space suit and one thing and another, sep switch. Right now, Bill and Joe are handling the pieces of the space suits helmet and putting defog on and doing everything that has to be done to make what is normally a very difficult operation during space and so forth. How are you getting the picture of the middeck?

CAPCOM Roger, Vance, we got an outstanding picture down here.

SPACECRAFT Okay, of course, middeck is our living quarters and (garble). We do experiments down there, and we sleep all over the spacecraft. There's a bathroom down in the middeck which is off to the side. Up here again on the flight deck, why we're doing everything that has to do with controlling the spacecraft and operation of the cargo handling equipment and so forth in the middeck. We had a nice picture of the Earth here, which I want to jump back too. The cloud patterns up here that you can see are just fantastic. Well, Bob and I are going downstairs to, and we'll try to get everybody into the picture.

CAPCOM Roger, and we're getting a beautiful color picture down here.

SPACECRAFT Okay, we're down here, as you can see in weightlessness it's a little hard to get organized. We all have to have something to hold onto. It's quite interesting though, cause, just call the floor the ceiling, vice versa, and the gang of four here - we have quite a bit of fun in spare time doing all this EVA stuff.

SPACECRAFT We really do work once in a while.

CAPCOM Roger.

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SPACECRAFT Get any of that or did it come out a complete mess?

CAPCOM You guys got outstanding lighting up there, that's a beautiful picture.

SPACECRAFT Well, it's not such a big room, and we generally have it sort of unpacked - we have food, clothing, cameras, experiments, you name it.

END OF TAPE

SPACECRAFT Well it's not such a big room and we generally have it sort of unpacked - we have food, clothing, cameras, experiments, you name it, all over. So anyhow that's sort of a capsule summary of what we are doing up here right now, and we're looking forward to the EVA tomorrow.

CAPCOM Roger Vance, we're losing your picture here, we're 30 seconds from LOS and I'd like to remind you, you have a PMC scheduled at Santiago at 8 plus 27.

SPACECRAFT Okay, very good. See you later.

CAPCOM Roger.

PAO This is Mission Control Houston. Loss of signal at Hawaii after a tour of the Spacecraft, and TV of the preps for tomorrow's space walks by Lenoir and Allen. 18 minutes until reacquisition through the Santiago, Chile tracking station, midway through orbit number 38. At day 2, 8 hours 9 minutes, Mission Control Houston.

PAO Mission Control Houston, we have acquisition through Santiago, Chile tracking station. This is Mission Control Houston.

CAPCOM Columbia, Houston with you through Ascension for a few seconds, over.

SPACECRAFT We copy.

CAPCOM And be advised there that we'd like to do our tag up message here at IOS at 8 plus 59, if that's okay with you guys.

SPACECRAFT Okay, we may not be ready for it, (garble) we'll do our best.

CAPCOM Okay, and we're about to go LOS here, we'll talk to you through IOS at 8 plus 59. You might pass to Joe that Yale beat Princeton today, 37 to 19.

SPACECRAFT Say that again, 37, 19? Who was that?

CAPCOM Yale beat Princeton, 37 19.

SPACECRAFT Outstanding, Yale beat Princeton.

SPACECRAFT Mike I've got all those theodolite numbers, I guess you just want me to bring them home with me, right?

CAPCOM That's affirmative Bob.

SPACECRAFT You can tell RMU that I took each measurement twice and I got great repeatability, so I think they are pretty good.

CAPCOM Okay, we copy that Bob.

SPACECRAFT Read you loud and clear, I might have some problems with my battery, but they seem to be working.

SPACECRAFT Okay Bill.

SPACECRAFT Clear there Joe.

CAPCOM Columbia, Houston, with you through IOS for 6 minutes, over.

SPACECRAFT Columbia. Are you calling?

CAPCOM Roger Columbia, we're with you for about 5 and 1/2 minutes now through IOS.

SPACECRAFT Okay Mike, we just finished the EVA COMM check.

CAPCOM Roger, we copy.

CAPCOM And Columbia, Houston, we can start our tag up topics at your convenience

SPACECRAFT Okay, go ahead Houston.

CAPCOM Okay, we've got about 5 minutes left in this pass now. The PRSD and vernier RCS and forward COAS CAL all looked real good today. No significant stratification effect was seen in the PRSD test. Bob's habitability report was very good. We lost the sleep configuration comments from Bill and Vance on that recorder. We'd like to get your medical VTO comments sometime if we could. As far as anomalies, we've got the circuit breakers essential IBC left audio circuit breaker back there popped, we'll be looking at that, we'll probably want to reset it, possibly looking at an alternate entry configuration. We'd like to find out which wireless set Vance is on right now, and if you're connected to the OS panel.

SPACECRAFT Okay, right now I have wireless E down at the OS panel, but it's been disconnected since we're setting up that panel for the EVA VTR.

END OF TAPE

SPACECRAFT Okay, right now I have wireless E down at the OS panel but it has been disconnected since we're setting up that panel for the ETA VTR stuff tomorrow and right now Joe's off headset I'm using - he's off his wireless and I'm using it.

CAPCOM Roger, we copy. And just a reminder to check the OS panel for the sleep configuration when you get around to that. And the only other anomaly we got was the water (garble) water we saw today, we plan to schedule an inspection later in the flight. Right now the humidity level is about 36 percent which is about right. As far as sleep configuration we'd like you to go ahead and repress the left oms if you would. Just take the left oms helium press (garble) 1506 A switch to open about 30 seconds back to close and that will allow us to check out the regs and repress that system after being interconnected to it all day.

SPACECRAFT In left oms you want bravo or alpha, Mike?

CAPCOM Roger, we'd like alpha open for about 13 seconds, Bob.

SPACECRAFT Okay, how many seconds? 30?

CAPCOM That's affirmative.

SPACECRAFT Mike, there's one thing I missed. Something - the very end when you were talking about the OS panel, something you want me to do to it.

CAPCOM Roger. We'd just like to make sure you remember to configure that panel in the sleep configuration when you get around to doing it.

SPACECRAFT I think what we'll do is we'll leave it off, we'll leave the wireless off of it tonight and we'll - in the morning we'll be having it configured for the EVA TV stuff. If that's all right. We'll leave it that way tonight.

CAPCOM Okay, that sounds like a good idea, Vance. You can expect a state - state vector good message sometimes during the sleep and we also plan to send up a DEU checkout message over Guam. Just to make sure you have it onboard if it's necessary. If you do have anything you want to put on ICOM tonight a good way to do that is to let us know when you've done that is to do an IO reset to the SM GPC and that gives us a BCU bypass SCA message down here and we can read that real well.

SPACECRAFT Okay. Is that better than cycling CRT or - okay, understand. You don't want CRT's power cycled so we'll remember - I'll reset to SM.

CAPCOM Roger, we'd just like to avoid the fast power cycle on the CRT's if we can.

SPACECRAFT Okay.

CAPCOM And Columbia, Houston. Be advised we're not going to be recording voice during the sleep period here. Unless you request it. Use the power cycle to tell us then. Use the IOE set on the SM machine to tell us that. And all you're consumables are in good shape and we'll probably give you a comm delta for EVA tomorrow due to the commander's comm configuration there.

SPACECRAFT Okay, good. That comm hassle was sort of very unfortunate just before a real live TV here.

CAPCOM Roger. Go ahead and close the left oms helium press there and we'll talk to you one more time through Guam at 9 + 25.

SPACECRAFT Okay.

PAO This is Mission Control Houston. Loss of Signal through the Indian Ocean Station. Next station which will likely be the final contact with the crew before the sleep period will be Guam in 19 minutes. Spacecraft now just beginning the 39th orbit of the Earth on the 5th flight and that day 2, 9 hours 6 minutes Mission Control Houston. No, backup one. We're estimating an hour from now. The change of shift briefing with offgoing flight director Dr. John Cox in the JSC newsroom. That's at 4:20 central.

END OF TAPE

PAO ...director Dr. John Cox in the JSC newsroom.
That's at 4:20 central.

PAO This is Shuttle Mission Control, mission elapsed time 2 days, 9 hours 39 minutes. A brief pass over Hawaii here on orbit 39. Just about 2 minutes of signal but no voice contact (garble) We're in the sleep period now but there will be downlink telemetry to the ground station in Mission Control team here will be able to look at the health and well being telemetry fed down from Columbia. Flight Director John Cox has completed tag up with the on coming flight team and Flight Director Garry Cullen. And the planing team is now in place at Mission Control Center. Dr. Cox will be on his way over to the building 2 news center for change of shift briefing at 4:20 p.m. central time. This is Shuttle Mission Control. This is Mission Control Houston. Mission elapsed time 2 days, 10 hours 2 minutes. The change of shift briefing with flight director John Cox could occur as early as 4:40 p.m. central time in the building 2 newscenter. Less than a minute away from acquisition of signal through Santiago, Chile and although we are in the crews sleep period, just a few minutes inside their sleep period we anticipate that the cap comm will establish voice contact with the crew and advise them of changes to the correct - will be playing for tomorrow ...

SPACECRAFT This is Columbia, loud and clear.

CAPCOM We've got a slight change here for your Vance. We thought we'd pass to you before you go to sleep this evening. We've had some consultations here in mission control and we're going to exercise flexibility that we've built into the flight plan for the next couple of days and do your EVA on flight day 5. That will give you some things to do on flight day 4 tomorrow. We worked up the plan already and we're going to pass it up to you on your teleprinter review early in the morning.

SPACECRAFT Okay, understand. EVA the flight day 5, you'll pass up a plan for tomorrow on the teleprinter.

CAPCOM That's affirmative. Basically there's almost a swap day 5 for flight day 4 with some changes but they are going to be minor and should be no problem. And since we're keeping you awake a little bit later tonight, we're going to let you sleep in till 18:10 in the morning so you can make up this 40 minutes.

SPACECRAFT Okay, we'll sleep in till 18:10.

CAPCOM That's affirmative and we will see you then.

SPACECRAFT Okay, very good. And we're going off the air.

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CAPCOM Goodnight, sleep well. We'll see you in the morning.

SPACECRAFT Alright.

PAO This is Mission Control Houston. CAPCOMM announcement to change flight plan day 5 for day 4 which effectively changes the EVA from Sunday to Monday morning. Decision made here in the control center just to maximize the potentials for giving the most possible effectiveness on the extra vehicular activity. And further more the advice the crew is going to be permitted to sleep in a little bit later than originally scheduled for tomorrow morning and changes in the crew activity plan which for the most part constitutes an exchange of the flight plan and activities for day 5 with those scheduled for day 4. And the detailed summary time line will be uplinked to the crew's teleprinter during the sleep period and be ready for their approval tomorrow morning. Mission elapsed time 2 days, 10 hours 5 minutes, this is Shuttle Mission Control.

END OF TAPE

PAO This is Shuttle Mission Control 2 days 10 hours 10 minutes. Off-going Flight Director John Cox advises that his change of briefing will be conducted at 4:50 p.m. Central Standard Time in the Building 2 News Center at Johnson Space Center. Once again that change of shift briefing with Flight Director John Cox at 4:50 Central Time.

PAO Shuttle Mission Control mission elapsed time 2 days 11 hours 45 minutes, Columbia on its 41st orbit of the United States, of the Earth, in the crew sleep period and the crew apparently passing a restful night downlink data indicates systems onboard the vehicle continue to function nominally.

PAO This is Shuttle Mission Control at 2 days 13 hours 23 minutes, Columbia on its 42nd orbit of the Earth just completed a pass over the ground station at Santiago, Chile got downlink data telemeter to the Santiago station from the vehicle and transmitted tracking that were indicating that the vehicle's flight systems continue to perform nominally. The crew, of course, in its sleep period just slightly less than 5 hours remaining before the wakeup. At 2 days 13 hours 24 minutes mission elapsed time this is Shuttle Mission Control.

PAO This is Mission Control Houston mission elapsed time 2 days 15 hours 52 minutes. Partial power failure had occurred in the Mission Control Center. The failure is traced to an electrical bus, the center still has essential communications and tracking capabilities, but temporarily lost some timing displays and some data displays. The control team's presently working to restore these. About the same time as the failure the center's fire fighters responded to an alarm on the first floor. They found smoke coming from a power filter which was determined to be related to the partial power outage. The full power is expected to be restored to the control center in less than an hour. Mission elapsed time is 2 days 15 hours 52 minutes, this is Shuttle Mission Control.

PAO This is Shuttle Mission Control at 2 days 16 hours 44 minutes. The power system which failed still hasn't been restored but the Mission Control team has worked around that failure to the extent that full capability has been restored. The timing displays are back in order and the data displays are, one's concurrent and working. Of course downlink telemetry and command capability was never interrupted and it's clear that there were no caution and warning alarms activated onboard the vehicle and the crew has passed an uninterrupted night, and is apparently resting quietly, a couple of hours still remaining in their sleep period. Columbia on its 44th orbit of the Earth and the Mission Control team is preparing teleprinter messages to uplink to the vehicle to advise the crew of its revised activity plan for tomorrow. Mission elapsed time 2 days 16 hours 45 minutes this is Shuttle Mission Control. END OF TAPE

PAO ...to the vehicle to advise the crew of its revised activity plan for tomorrow. Mission elapsed time 2 days 16 hours 45 minutes, this is Shuttle Mission Control.

Wake Up Call (music) "Halls of Montezuma"

CAPCOM Good morning Columbia. Time to rise and shine.

SPACECRAFT Columbia this is, Houston, Columbia. Good morning, how are you doing?

CAPCOM We're doing great down here. The Marine Hymn is in honor of our two Marines onboard and your recent Marine Corps birthday.

SPACECRAFT Okay, well we'll get Bob up, get his comments on it there. Thanks for the fine music.

CAPCOM You're welcome. We're about 1 minute away from a short keyhole here at Mila. We'll be with you at Bermuda for about another 7 minutes after that.

SPACECRAFT Okay, fine.

PAO Shuttle Mission Control mission elapsed time 2 days 18 hours 12 minutes. The two Marines onboard obviously. Columbia pilot Bob Overmeyer, active duty Marine Corps Colonel, and Vance Brand began his career as an aviator as a Marine Corps pilot. Acquire signal momentarily through Bermuda station as we have brief LOS through a keyhole.

CAPCOM And Columbia, Houston, back with you for about 4 more minutes at Bermuda.

SPACECRAFT Roger.

CAPCOM And Vance, we believe we have a copy of all of our TPR messages onboard. When you get a chance, we'd like for you to make sure you receive message 24 and second copy of message 25. We're not too sure of the transmission of those pages.

SPACECRAFT Okay. Yes, right now we have just one message there that can be used to mark up everybody's CAP's so we could get one or two more of that (garble), but we'll see what we're going to do.

CAPCOM Yes, we're trying to get them up to you as fast as we can. We were just wondering about the clarity of those two 24 bravo and the second copy of 25.

SPACECRAFT Okay.

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CAPCOM And if you get a chance, we got a couple of three switches here for you for reconfiguration for the cryo.

SPACECRAFT Ready to copy.

CAPCOM Okay on R1 02 tank 3 heater alpha to auto, and take the H2 tank 3 heater alpha and bravo to auto.

SPACECRAFT Okay, that was on R1 02 tank 3 heater A to auto, H2 tank 3 A and B to auto.

CAPCOM And that's correct.

SPACECRAFT That's H2 tanks 3 A and B to auto.

CAPCOM That's affirmative. All three of those to auto. And Vance, you might tell Bob that Baldwin Wallace beat Ohio Wesley in 24 to 0 yesterday. Columbia, we're about 30 seconds to LOS...

END OF TAPE

CAPCOM ... and Vance, you might tell Bob that Baldwin Wallace beat Ohio Wesley in 24 to 0 yesterday. And Columbia, we're about 30 seconds to LOS. We'll see you over Dakar at 18 21.

PAO This is Shuttle Mission Control. This is about 3 and 1/2 minutes before we reacquire again. TPR being discussed by the CAPCOM during that pass and, of course, the teleprinter messages are uplinked to the crew which they use as a basis for altering their crew activity plans which summarizes their day's events.

CAPCOM And Columbia, Houston's back with you for about 8 minutes through Dakar in Madrid.

SPACECRAFT Okay, Roger, Houston, we're in the midst of cutting up slips of teleprinter paper right now.

CAPCOM Okay, let us know if you need anything else.

SPACECRAFT Roger, we just got some more paper by the way.

CAPCOM Yes, we're uplinking the rest of your copies of the CAP update.

SPACECRAFT Okay.

CAPCOM And if Joe's listening, DePaul got beat yesterday by Wabash.

SPACECRAFT Joe's off COMM right now, but we'll sure pass it on to him. Wasn't like 24 to 0 though, was it?

CAPCOM Well, it's about the same spread. It was 31 to 6.

SPACECRAFT Okay.

CAPCOM And Colorado beat Kansas 28 to 3.

SPACECRAFT Glad to hear they came up with a win.

CAPCOM Think somebody was interested in UCLA score. They beat Stanford 38 to 35.

SPACECRAFT I don't think anybody was interested in UCLA.

CAPCOM Okay. We'll forget that one. Columbia, Houston, we're about 45 seconds to an LOS here at Madrid. We'll see you over Indian Ocean in about 12 minutes at 18 41.

SPACECRAFT We'll see you there. END OF TAPE

PAO This is Mission Control, mission elapsed time is 2 days 18 hours 39 minutes. Columbia on orbit 45, a little more than 1 minute from reacquisition of signal thru the Indian Ocean Station. Plans are presently to cancel the change of shift briefing with Flight Director Gary Coen originally scheduled for 2:50 a.m. Central Time. Plan to cancel that in recognition of the fact that events have been rather static since the last change of shift briefing. The Flight Activities Office here has announced this morning that the morning messages to the crew on the teleprinter consumed 12 feet of teleprinter paper, bringing the total footage of teleprinter paper used so far in STS-5 to 47 feet. Crew is in its post-sleep activity period, meaning it's reconfiguring cabin lighting, windows, and doing some stowage of sleep gear and readying itself, with proper documents for the days events. Once again the 2:50 a.m. change of shift debriefing with Flight Director Gary Coen has been cancelled, and we are standing by for acquisition of signal momentarily thru the Indian Ocean station.

CAPCOM Columbia, Houston, with you for about seven minutes at Indian Ocean. Should you need us for anything, we'll be standing by

SPACECRAFT Okay Houston, we copy.

CAPCOM Columbia, Houston. We're about 30 seconds to LOS in Indian Ocean. See you at Yarragadee at 18 57 and there is PMC scheduled for Orroral after that.

SPACECRAFT Roger, we understand Brian, thank you. Oh, sorry Jon, we copy.

CAPCOM Okay. Columbia, Houston, with you at Yarragadee for a little less than 7 and a half minutes.

SPACECRAFT Roger, copy. (garble), Houston?

CAPCOM Reading you loud, with a squeal on the background. Columbia, Houston, we've got about another minute here at Yarragadee. Surgeon will talk to you over Orroral and we'll see you in about 38 minutes at Mila.

SPACECRAFT Roger, we copy. 38 minutes at Mila, and surgeon over Orroral, thank you. (garble)

PAO Shuttle Mission Control, mission elapsed time 2 days, 19 hours five minutes, entering into a rather extensive loss of signal period of about 38 minutes till we reacquire thru Mila ground station.

CAPCOM Columbia, we're with you for a short 20 seconds unless you have something real quick for us, we'll see you at

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CAPCOM ...and Columbia, we're with you for a short 20 seconds unless you have something real quick for us we'll see you at Mila 19 41.

SPACECRAFT Okay, I don't think we have anything more, we'll see you at Mila then.

CAPCOM Okay, good luck on the IMU. Columbia, Houston, with you through Mila and Bermuda for about 12 minutes standing by.

SPACECRAFT Roger Houston, and we have IMU results, IMU alignment results, for you.

CAPCOM Okay go ahead we're ready.

SPACECRAFT Houston, alignment follows. Stars 45 and 24 angular error .02, starting delta X plus .08 -.14 -.02, delta Y +.02 +.02 +.05, delta Z +.16 -.00 +.09, execution time, day 2 19 hours 36 minutes, over.

CAPCOM Yeah we copy all that Vance, sounds good.

SPACECRAFT Okay and have one other comment, following the align I went to hit an item 19 to start the track maneuvering inadvertently I hit the item 19 on SPEC 21, which is a mass memory read, thought I'd tell you of the inadvertent keypunch there, and ask what the implication is, if any.

CAPCOM Okay Vance, we'll look into that and I'll get right back to you.

SPACECRAFT Jon, one comment from the aft deck right now, we got a little ahead and I'm in the fuel cell purge and water dump at this time, and I noticed that that's a little bit ahead, is there any problem with that?

CAPCOM No, there's no problem with that go right ahead.

SPACECRAFT Okay, I will hold off vent with that heater activation until 2040 per the CAP, is that affirm?

CAPCOM That is affirmative.

SPACECRAFT In fact Jon, if he comes down here, will you tell me what he would estimate the many time for that bravo tank dump this afternoon.

CAPCOM Yeah, we'll get you an estimate and get right back.

SPACECRAFT Yeah I'll appreciate it. I'll set a clock on that.

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CAPCOM And Bob, our best estimate is it's going to take about 50 minutes for that water dump.

SPACECRAFT Okay, that's about what I came up with, so we'll just set a time for about 45 and come up and look at it.

CAPCOM Sounds good. And Vance, we looked into your execution of item 19 on SPEC 21 and its no impact. We'll have to reupdate our gyro drifts down here, but other than that there's no impact, as far as your concerned.

SPACECRAFT Okay, sorry about that.

CAPCOM That's alright, it's still early in the morning. And Vance if you would, we would like for you to select a DAP bravo.

SPACECRAFT Okay DAP bravo.

CAPCOM And Columbia, we're taking some bets down here, we wonder if Bob Overmyer really did sleep through the Marine Corp Hymm?

SPACECRAFT Ah better let him say. The only answer I could give would get me in trouble Jon, just get me in trouble.

CAPCOM Copy that.

SPACECRAFT The other morning he was the first guy up, he just sacked in today. Hey listen Jon, I usually get up early so I can get my timeline set.

CAPCOM Yeah, we copy that Bob.

END OF TAPE

CAPCOM And Columbia, we're taking some bets down here. Did Bob Overmyer really sleep thru the Marine Corp Hymm?

SPACECRAFT Uh, better let him say. The only answer I could give would get me in trouble Jon, just get me in trouble.

CAPCOM Copy that.

SPACECRAFT The other morning he was the first guy up, he just sacked in today. Hey listen Jon, I usually get up early so I can get my sideburns cut.

CAPCOM Yeah, we copy that Bob. TV yesterday looked like you had about a two or three-day growth.

SPACECRAFT (Garble) Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT We were all just wondering if Bob would have his paycheck waiting for him when he gets back?

CAPCOM We'll call the dispersing clerk and check on that for him. And we've got about 30 seconds here at Bermuda, we'll see you over Dakar at 19 57.

SPACECRAFT Okay, see you there.

PAO Mission Control Houston. 2 days, 19 hours 55 minutes mission elapsed time. Have a brief gap in the communication as the Columbia passes out of range of the tracking station in Bermuda. Reacquire over Dakar in about a minute and a half.

CAPCOM Columbia, Houston. Back with you at Dakar for about 7 minutes.

SPACECRAFT Roger, we got you.

CAPCOM Columbia, we're about a minute to LOS at Dakar. We'll see you over Indian Ocean in about 13 minutes at 20 16.

SPACECRAFT Okay, see you there.

Dakar voice control, air-to-ground 2 voice check.

PAO Mission Control Houston, at 2 days 20 hours 6 minutes mission elapsed time. Columbia has just passed out of range of the tracking station at Dakar and will reacquire in about 9 minutes and a half over Indian Ocean station.

CAPCOM Columbia, Houston, with you at Indian Ocean for

about 8 minutes.

SPACECRAFT Okay, we're reading you a little weak.

CAPCOM Okay, I guess our first order of business here is to turn you over to doctors Holloway, Stewart, Bridges and the rest of the ivory team. And we'll see you again tonight. Hope you have a good day.

SPACECRAFT Okay, thank you Jon. We had you with us for a longer period this morning and good talking to you. We'll see you later.

CAPCOM Yeah, we enjoyed it too, we'll see you tonight.

SPACECRAFT Just let the planning team know we've digested all of the changes and looks like we're off and running for the day.

CAPCOM That's great. We were hoping we wouldn't load you down too bad.

SPACECRAFT No, we got by fine. Good job.

CAPCOM Thank you, sir. Columbia, Houston. Vance, I have a flight note for you that will affect the burn coming up.

SPACECRAFT Okay, go ahead.

CAPCOM Roger, we would like for you to repress the right OMS using the A-leg only.

SPACECRAFT Depress the right OMS using the A-leg only. Bob's got that.

Okay, I'll get it

CAPCOM Okay, you can do that sometime before the burn, and the other note is we would like for you to return to a nominal configuration on the right POD, reselect jets R2 delta and R3 delta.

SPACECRAFT Do we understand about reselection of jets? The way you said normal configuration on the right POD, you were referring to jets, not OMS?

CAPCOM That's affirmative. Just reselecting those two jets. And the reason is, looks like R4D heater now is failed OMS so its a little hotter than normal and in a way that will probably help us out because we won't have any concern about it during the no sun tonight.

END OF TAPE

CAPCOM ...we would like for you to return to a nominal configuration on the right POD. Reselect jets R2 delta and R3 delta.

SPACECRAFT We understand about the reselection of jets. When you said nominal configuration on the right POD you were referring to jets not OMS?

CAPCOM That's affirmative. Just reselecting those two jets, and the reason is, looks like R4D heater now has failed OMS, so it's a little hotter than normal, and in a way, that'll probably help us out because we won't have any concern about it during the nose sun tonight.

SPACECRAFT Okay, so we'll get that done right away. Thank you.

CAPCOM Roger. Columbia, Houston, 30 seconds LOS. See you at Yarragadee at 3 2.

SPACECRAFT (garble)

PAO Mission Control Houston 2 days 20 hours 25 minutes mission elapsed time. Columbia's passed out of range of the tracking station at Indian Ocean orbit number 46 reacquire over Yarragadee about 6 minutes 45 seconds. Earlier this morning there was a medical conference the results of which Dr. Sam Poole has indicated that Bill Lenoir is improving. Earlier he had, of course, experienced some space motion sickness difficulties and that was the reason for moving the EVA, swapping out this flight day with tomorrow's. He's said to be improving and expected to continue to improve during the day. The doctor's instructed him to drink fluids and eat light meals. The other crewmembers are reported at 100 percent, just feeling fine. Crew is currently scheduled to be in a meal period and there are some fairly brief activities this morning on the new timeline as revised to reflect the change in moving EVA day. In about 30 minutes Commander Vance Brand will initiate a maneuver to put the Columbia on the starboard sun attitude. About 30 minutes after that, he will deactivate the Get Away Special cannister. Later on in the morning the Mission Specialists, Allen and Lenoir, are scheduled to conduct some of the medical DSO's, the Detail Supplementary Objectives. Those are the ones that relate to gathering data on eye movements and other vestibular related things that might give us some additional information on the response of human vestibular system to space. First television this morning is scheduled for around 8 a.m. At 2 days 20 hours 28 minutes mission elapsed time, this is Mission Control Houston.

CAPCOM Columbia, Houston, with you through Yarragadee for 8 minutes.

SPACECRAFT We copy.

CAPCOM Okay and you're 5 by.

SPACECRAFT And we're shutting off the dump valve here pretty quick.

CAPCOM Okay, Bob, thank you.

SPACECRAFT Okay, the dump is complete and I'd go ahead and repress the right OMS. Is that too soon, or is that alright?

CAPCOM Ah, Bob, it's ok to go ahead.

SPACECRAFT Okay, that's complete also.

CAPCOM Roger.

SPACECRAFT Houston, Columbia, the steam vent heater is activated. I just got a message on that.

CAPCOM Say again heater, Bob.

SPACECRAFT Just activated the APU steam vent heater activation. That step's about 7 minutes early.

CAPCOM Okay, we copy. Thank you very much for copy.

END OF TAPE

PAO First television this morning is scheduled for around 8 a.m. at 2 days 20 hours 28 minutes mission elapsed time this is Mission Control Houston.

CAPCOM Columbia, Houston, with you through Yarragadee for 8 minutes.

SPACECRAFT We copy.

CAPCOM Okay and you're 5 by.

SPACECRAFT And we're shutting off the dump value here briefly.

CAPCOM Okay Bob, thank you.

SPACECRAFT Okay the dump is complete and I go ahead and repress the right OMS is that to soon or is that alright?

CAPCOM Bob it's okay to go ahead.

SPACECRAFT Okay that's complete also.

CAPCOM Roger.

SPACECRAFT And Houston, Columbia, the steam vent heater is activated I just got a message on that.

CAPCOM Say again, the heater Bob?

SPACECRAFT Just activated the APU steam vent heater activation that step about 7 minutes early.

CAPCOM Okay we copy. That you very much for copy.

SPACECRAFT Houston, Columbia

CAPCOM Go ahead.

SPACECRAFT Got SPEC 86 up on CRT 3 and I don't see anything in there that's unusual that gave that message do you at all?

CAPCOM Bob we don't have any data, could you tell us what the message was?

SPACECRAFT Yeah right after I activated the water steam vent I got the SPEC 86 APU hydraulic water warning.

CAPCOM Okay we copy.

SPACECRAFT I think it's just because it all goes to heater bravo on that at the after start and stay in the boiler control

power heater 3 on the bravo and then the control on I think that's all that did it.

CAPCOM Okay

SPACECRAFT Unless you tell me differently i'm going to write that off as nominal and I'm going to need to look at it when we come over the next S-band site.

CAPCOM Roger we'll look at that over Orroral Bob we'll be coming up there about 42 and just press on for now.

SPACECRAFT Okay. Real pretty view of Australia right now Roy.

CAPCOM Roger copy Bob.

SPACECRAFT It's so neat I'll tell you, it's so neat.

CAPCOM Yeah we had FAO draw us a little picture of the, picture window view that you had yesterday and we can see why you were so impressed. It looked like you were looking at the whole continent through the front windows.

SPACECRAFT Looking at the whole world, it's really unbelievable. Side Sun attitude, it's an amazing attitude looking out the front windows here.

CAPCOM Bob personally I can't wait to try it.

SPACECRAFT Let me tell you regardless how long you have to wait, it's really worth the wait. I can speak with authority on that one.

CAPCOM Roger I understand Bob. Columbia, Houston, we're 15 seconds LOS, we'll pick you up at Orroral at 42.

SPACECRAFT Thank you.

CAPCOM Columbia, Houston, with you at Orroral for 3 minutes.

SPACECRAFT Okay Roy.

CAPCOM Columbia, Houston, Bob we think cause of that message was the fact that you went to water a boiler bravo and the water quantities go to zero and so we would expect that message.

SPACECRAFT That's what I ought it was but I just wanted to be sure that's the standard.

CAPCOM Roger

SPACECRAFT Figured wouldn't hurt to ask.

CAPCOM Roger

SPACECRAFT Roy for you information I just started the PAM ASE thermal test for SPS just a few seconds ago and verify which SCA you want to be giving you the data for ANIK?

CAPCOM Standby. Columbia, Houston, Joe use SCA 1 for the ANIK.

SPACECRAFT Okay SCA 1 for ANIK, thanks Roy.

CAPCOM Okay we'll see you in Mila at 17 after we're going LOS.

SPACECRAFT Okay

PAO Mission Control Houston 2 days 20 hours 45 minutes elapsed time. Columbia's just passed on a range of the tracking station at Orroral, Australia and we've got about a 32 minute loss of signal period here until we reacquire over the U.S. Crew seems to be on or a little bit ahead of the timeline. Mission Specialists performing the payload assist module test on the remaining equipment that stays in the cargo bay after those satellites are redeployed and they do some testing with those, with that equipment. Bob Overmyer's a little bit ahead reporting that he has about 10 minutes ago completed the APU steam vent heater activation which is a preparation for the flight control system to checkout later in the day. 2 days 20 hours 46 minutes mission elapsed time this is Mission Control Houston.

END OF TAPE

PAO ...test on the remaining equipment that stays in the cargo bay after those satellites are deployed and they do some testing with those, with that equipment. Bob Overmyer is a little bit ahead reporting that he is, about 10 minutes ago completed the APU steam vent heater activation which is in preparation for the flight control system checkout later during the day. 2 days 20 hours 46 minutes mission elapsed time, this is Mission Control Houston.

CAPCOM Columbia, Houston, with you at Mila and Bermuda for 12 minutes.

SPACECRAFT Hello Houston, this is Columbia. Report from the middeck, Bill's wired up for the EOG measurement now. We're putting on the potentiometer cap right now and if you all can look real time, you should see some voltages coming thru on your strip chart shortly.

CAPCOM Okay, Joe. We'll look and I'll get back to you in a minute and we'll see.

SPACECRAFT Houston, Columbia.

CAPCOM Roger Columbia, go ahead.

SPACECRAFT Okay, we got the three-engine soakback burn complete at 20 hours 55 minutes 45 seconds, that was actually start of burn. We did it for 30 seconds and recorded delta VX of -.02, Y -.23; Z +32.59, delta V total 36.84.

CAPCOM Okay Vance, we copy.

SPACECRAFT You know, the burn went as planned, completely nominal and we're back in side sun.

CAPCOM Roger.

SPACECRAFT Okay Houston, are you ready for the strange (garble) signal conditioners on?

CAPCOM Roger, we're ready.

SPACECRAFT You got 'em?

CAPCOM Roger.

SPACECRAFT And Houston, from the middeck. On page FS7-4, we've just finished with the paragraph underneath, about a third of the way down, underneath the line that says fit control box position 4.

CAPCOM Okay, we copy that. Columbia, Houston. Joe, the

we're getting a good signal down here.

SPACECRAFT Okay, good news. We're doing part B of position 4 right now.

CAPCOM Roger.

SPACECRAFT And the subject is MS1/2 and the experiment door is MS2/1.

CAPCOM Roger, it couldn't be clearer, Joe.

SPACECRAFT Neither could the directions! Houston, we're going to position (garble).

CAPCOM Say again, Joe. I didn't copy that.

SPACECRAFT Houston, we're on position 5 now, tracking the lights.

CAPCOM Roger, copy 5.

SPACECRAFT And Houston, we'll be deactivating the GAS in about 7 or 8 minutes.

CAPCOM Okay, copy Vance.

SPACECRAFT Position 5 is completed, we're going now to start position 6, but we have to get set up.

CAPCOM Roger. Columbia, Houston we're 30 seconds less. See you over Dakar at 3 2.

SPACECRAFT Okay, it's (garble)

CAPCOM That's affirmative, you can turn them off. And Columbia, Houston, Joe, you can go to the next position on the box.

SPACECRAFT Okay, we're getting ready to, hang on just a second, to the position 6, we're getting ready to go to position 6. We're configuring some video of this.

CAPCOM Okay and we're LOS now.

PAO Mission Control Houston, 2 days, 21 hours 31 minutes mission elapsed time. Brief gap in the communications here as Columbia passes between the ranges of the continental U.S. or Bermuda tracking station and the one in Dakar. Crew is moving along well on the timeline this morning. Lenoir and Allen are proceeding with some of the medical....
END OF TAPE

PAO Mission Control Houston 2 days 21 hours 31 minutes mission elapsed time a brief gap in communications here as Columbia passes between the ranges of the Continental U.S. or Bermuda tracking station and the one at Dakar, the crew is moving along well on the timeline this morning. Mission Specialists Lenoir and Allen are preceeding with some of the medical DSOs supplementary objectives, some of the testing that was scheduled to be done, Vance Brand reported that the aft RCS 3 engine soakback test had been performed and it looked nominal, that is a test were they fire 3 of the attitude control jets at the rear of the spacecraft for an extended period of time and then observe how the heat soaks back through the structure. Spacecraft is now maneuvered back into the starboard Sun position and the thermal testing on the payload assist modules have been completed. Crew reported that they were expecting to deactivate the Get Away Special towards the end of that pass and we expect that they have probably done that by now, about 20 seconds away from reacquiring signal with Columbia over Dakar. Orbit number 47 at 2 days 21 hours 32 minutes mission elapsed time, Mission Control Houston.

CAPCOM Columbia, Houston, with you at Dakar for 8 minutes.

SPACECRAFT Roger we copy, we just finished box 6 we're going to box 7.

CAPCOM Roger copy

SPACECRAFT Okay Roy if you want the report on the elevons, looks like the starboard outboard is full up, starboard inboard is full up, port inboard is full up and port outboard is somewhere down we can't see it, it may be full down and may be partial down but it's not obviously not, well you can't see it real well it's below the (garble), it's not neutral anymore it's drooping down somewhere.

CAPCOM Okay we copy Bob and I've go a message for you on the circuit breakdown hold down procedure.

SPACECRAFT Go ahead.

CAPCOM Okay we would like to defer implementing that message, message 24 BRAVO, we are still reviewing some data down here about, found some additional data we'd like to look at before we do it.

SPACECRAFT Okay I copied that and there'll be no problems staying on the OS COMM panel today till later on.

CAPCOM Roger Vance we copy and we'll get back to you on this as soon as if finish our daily review.

SPACECRAFT Yes sir and if it turns out that the circuit

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breakers should stay popped I presume that on entry day I can just go to right and use Bob's panel?

CAPCOM Okay Vance we're still looking to come up with a best plan for entry, right now we still think the system may be okay.

SPACECRAFT Okay, Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT The GAS experiment to (garble).

CAPCOM Okay copy GAS to (garble).

SPACECRAFT Houston this is Columbia

CAPCOM Go ahead.

SPACECRAFT Roger did you get about the right delta-V out of that 3 engine burn that we did about half hour ago?

CAPCOM Standby Vance and I'll check.

SPACECRAFT And Roy, Roy we just finished box 7 and I was a little late with the last marker indicating his eyes were closed that happened about halfway through his eye closed cycle, second cycle and we're not gonna switch from teste to testor. Does that mean I'm promoted or...

END OF TAPE

SPACECRAFT ...about halfway through his eyes closed-cycle, set to cycle, and we're now going to switch from testee to testor. Does that mean I'm promoted or demoted?

CAPCOM Columbia, Houston. We wondered if you think it would be practical to go ahead and do the cell detection sensitivity test while you're still set up?

SPACECRAFT Hey, Roy, right now our middeck habitability - wise is a disaster area. It takes us a half hour to get it cleaned up. Also we got the hatch open since the EVA equipment prep is complete. And that's right smack across the path that the springs would have to go.

CAPCOM Okay, we copy and that is what we wanted to know. So the answer is no and I guess you can go ahead and switch subjects.

SPACECRAFT Copy that, you weren't near fast enough. I already got the electrodes off.

CAPCOM Okay, good. And one other note, we're about 20 seconds LOS, for Vance or Bob, like for you to check pulse pulse on the adapt translation mode. And we'll be seeing you at IOS at 53.

SPACECRAFT Pulse, pulse, pulse and see you at 53.

CAPCOM Roger.

PAO Mission Control Houston. 2 days 21 hours 52 minutes mission elapsed time. About to reacquire communication with Columbia over the Indian Ocean station.

CAPCOM This is Houston with you through Indian Ocean for 4 minutes.

SPACECRAFT Okay. (garble) this is Bill, Joe has just completed position 5 on the EOG experiment. We're getting the operator (garble) on that now.

CAPCOM Okay, Bill, we copy Joe's completed 5. Columbia, this is Houston, we're 30 seconds to LOS at Indian Ocean. Talk to you next at Yarragadee at 0 8.

SPACECRAFT Okay, Bob.

PAO Mission Control Houston at 2 days 21 hours 58 minutes mission elapsed time. Just had loss of signal through the Indian Ocean station and will reacquire over Yarragadee in about 9 minutes, 9 and 1/2 minutes. Bill Lenoir reporting that Joe Allen is hooked up now in these medical data gathering tests

and the surgeon reports they're getting good data on the ground. The Commander and Pilot are due to start the flight control system checkout in about 45 minutes. They'll use the number 1 auxiliary power unit for that test. At 2 days 21 hours 59 minutes mission elapsed time this is Mission Control Houston.

CAPCOM Columbia, this is Houston with you through Yarragadee for 8 minutes.

SPACECRAFT Roger, Houston. Houston, Columbia a question.

CAPCOM Go ahead Columbia.

SPACECRAFT We just, a short time ago received some more teleprinter stuff which I assume is duplicate pages of some of the earlier stuff we got. Is that affirm, or should I go up through here to find differences?

CAPCOM Standby Vance. We're checking people that send it up to see what they say. Vance, we think the new teleprinter stuff is just spare copies of what you received earlier in the day.

SPACECRAFT Okay, thank you.

CAPCOM And Columbia, have some words for you about your TV passes today if you're free to listen.

SPACECRAFT Go ahead Bob.

CAPCOM Okay, Joe, originally you're schedule for TV on REV 49 at the upcoming Hawaii pass here.

END OF TAPE

SPACECRAFT Go ahead Bob.

CAPCOM Okay, Joe, originally your schedule for TV on REV 49 the upcoming Hawaii here, we did not cancel that. We did not schedule it in the CAP rewrite but we didn't cancel it at Hawaii either so we'll let. If you want to do some TV at REV 49 at Hawaii then let us know next time around.

SPACECRAFT Okay, Bob, I understand that and what's MET on that?

CAPCOM I don't have it right now, Joe, just a second.

SPACECRAFT Okay, I don't have a CAP in front of me. That's not, you don't, you aren't looking for the student experiments at that time. But just whatever TV we might send you, is that correct?

CAPCOM Yes, that's affirm, Joe, that's 3 hours and 0, 3 days 0 hours 20 minutes and it's only at your option. Nothing required there. Just let us know if you decide to send something down.

SPACECRAFT Okay, we've got quite a lot of tape taken, I'm not sure we want to sort through it to find some good things. We might just try to give you some live from the spaceship Columbia scenes out the window and also on the flight deck and on the middeck cameras. How's that sound?

CAPCOM Okay, Joe, but don't let it interfere with anything you've got going.

SPACECRAFT Okay, we're a little more organized today and we oughta something set up. But no music today.

CAPCOM And by the way while you're on the line, your TV that you gave us after the tile stuff, that terminator pass over Mila was very well received here on the ground. Very impressive pictures.

SPACECRAFT Okay, good, it's awesome to see from orbit it truly is. Bob, I was hoping to get a good night shot of Yarragadee. Last time we went over we're almost vertical to it and it would have been a good shot but this one's a little too oblique.

CAPCOM Okay, we copy that. (music) Columbia, Houston. Columbia, this is Houston.

SPACECRAFT Okay, Bob.

CAPCOM Okay, Columbia, Houston, we'll message another

message for Joe here. Reference your 35 millimeter cameras for the EVA. Concerned that we might be using up batteries too quick and if you can find them we'd like you to go back to the old batteries the rest of the day and change back to your fresh batteries just prior to the EVA or change it back to night if you can.

SPACECRAFT Bob, I understand that. We'll change to the brand new batteries tonight.

CAPCOM Okay, Bill.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead, Columbia.

SPACECRAFT Right, at the 22 20 timeframe on that message update that I have to change DAP A deadband attitude normal to 5 degrees. What's the DAP number on that. I did not see that on the message.

CAPCOM Standby. Let us sort through some paper down here Bob.

SPACECRAFT Just like to know the DAP number so I can check the whole DAP against that.

CAPCOM Bob, we're about 10 seconds to LOS here. The A... Columbia, this is Houston with you through Hawaii for 3 minutes. Columbia, this is Houston, with you through Hawaii for 3 minutes.

SPACECRAFT Houston, Columbia, loud and clear. And we're set up to start FRS checkout wherever you want it, if you want it, and which APU would you like to start up this morning.

CAPCOM Okay, Vance, we'd like to do the FCS checkout over the stateside pass and we'd like to do it on APU number 1.

SPACECRAFT Copy. Bob we've got number 1 ready to go when we hit the states.

CAPCOM Okay, Bob, and in answer to your question that you asked me at Yarragadee LOS. The DAP for this checkout will be A...

END OF TAPE

CAPCOMstateside pass and we'd like to do it on APU number 1.

SPACECRAFT Copy. And Bob, we've got number 1 ready to go when we hit the states.

CAPCOM Okay, Bob, and in answer to your question that you asked me at Yarragadee LOS, the DAP for this checkout will be A1 and the only change from that DAP that you're in right now is a 5 degree vs 3 degree deadband for the normal attitude.

SPACECRAFT I went to 5 degrees for a normal attitude, I think already.

CAPCOM Okay, that's fine, you were in A10 and the only change between A10 and A1 is that attitude deadband in normal jets.

SPACECRAFT Okay, we've got you 5-degree deadband.

CAPCOM Columbia, this is Houston. 20 seconds to LOS in Hawaii, and just a reminder that your water boiler problems, you might get a water boiler quantity down arrow, and a red "P" on, if your using the A controller on the into.

SPACECRAFT Okay.

CAPCOM Columbia this is Houston, with you thru Buckhorn for 7 minutes.

SPACECRAFT Roger, Bob, we're ready with your prestart complete waiting for your call.

CAPCOM Okay, you have a go for APU start.

PAO Mission Control Houston, crew has the first APU running and beginning to proceed thru the flight control system checkout.

CAPCOM Okay, Columbia this is Houston. We see the services have quit moving so you're go for the secondary.

SPACECRAFT Okay Bob. Okay, Houston, we're ready to shut them down.

CAPCOM Okay, Bob. Standby. Okay, Columbia, Bob you can go for the APU shutdown.

SPACECRAFT Okay.

PAO This is Mission Control and flight control system checkout is being completed and just now shutting off the APU

number 1 which was used to power the hydraulics to move the flight surfaces in that checkout of the flight control system. Columbia passing over the continental United States at the present time on orbit number 48.

CAPCOM Columbia, this is Houston. In about 10 seconds we're gonna go into 1 minute loss of signal and we'll talk to you thru Mila.

SPACECRAFT Okay, Bob.

CAPCOM Columbia, Houston is back with you thru Mila and Bermuda for 12 minutes.

SPACECRAFT Okay. Okay, Houston go ahead. Houston, Columbia.

CAPCOM Columbia, this is Houston, go ahead.

SPACECRAFT Okay, at the moment we're on, over OPS 7-14 during the MLS tacan tracking test, you might note that range is looking out of limits. It did and I recalled that I'd never done a (garble) reset so I tried that. It didn't do any good, range and (garble) both look out of limits high on all three LOU's, have we done something wrong?

CAPCOM Stand by Vance, we'll have the GNC guys have a look at it and get back to you. Vance, would you verify that was a tacan test?

SPACECRAFT That's affirm. We have the tacan set up per the way you had it set up in the message. Bob, do you see the sensor test on CRT 1, or else I can read you what the values are.

CAPCOM Columbia, would you check the tacan and see if they're in GPC?

SPACECRAFT Okay, tacans are in GPC now.

CAPCOM Okay, you need to do the test in GPC and then go back to the other configuration.

SPACECRAFT Okay, the message said TR. Okay, Bob (garble).

END OF TAPE

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CAPCOM Okay, well you need to do the test in GPC and then go back to the other configuration.

SPACECRAFT Okay, the message said TR. Okay, Bob, they pass.

CAPCOM Columbia, this is Houston. Another little problem. We'd like to look at some data on the RCS soakback so if you could give us a sample, please.

SPACECRAFT You got it? Houston, Columbia.

CAPCOM Go ahead Columbia, we have 15 seconds.

SPACECRAFT Okay, SPEC 44, just to verify we want to leave entry roll mode switches deselected, checklist.

CAPCOM That's affirmative, Bob, leave it deselected.

CAPCOM Columbia, this is Houston, with you thru Dakar and Ascension for 10 minutes. Columbia, this is Houston thru Dakar and Ascension for 9 minutes.

SPACECRAFT Roger, Bob, we copy. Houston, Columbia, how do you read?

CAPCOM Got you loud and clear Columbia. Columbia, this is Houston, you might make a note that as soon as you get a free hand up there we would like to get the three circ problems back to GPC mode and start the timers again.

SPACECRAFT GPC?

CAPCOM Columbia, this is Houston. We're going to get some weather up to you this pass. It'll take you thru REV 52.

SPACECRAFT Okay, fine Bob.

CAPCOM Columbia, this is Houston, 20 seconds to LOS at Ascension, Botswana will be coming up next at 2 3 2 6.

SPACECRAFT Check.

PAO Mission Control Houston. 2 days 23 hours 19 minutes mission elapsed time. Columbia has just passed out of range of the tracking station at Ascension. Will be reacquiring over Botswana in about 6 minutes 45 seconds.

CAPCOM Columbia, Houston with you at Botswana for 3 and a half minutes.

SPACECRAFT Houston, Roger. And we just completed the STS checkout and have a question about something regarding the message on checkout.

CAPCOM Okay, Vance, go ahead.

SPACECRAFT Message said, return tacan mode to TR after sensor test of STS checkout. I guess that's just for entry configurations or some other reason.

CAPCOM Standby one second.

SPACECRAFT Do you want the antennas, I think you want antennas on auto too.

CAPCOM Columbia, Houston. Vance, in answer to your question, the intent of the message was to gather some additional data for a tacan DTO. We're out of range of those stations, and you can go to the nominal configuration; antennas in auto, tacans off.

SPACECRAFT Okay, fine thanks.

CAPCOM Columbia, 1 minute LOS. We'll see you at Yarragadee at 43.

SPACECRAFT Good.

CAPCOM Columbia, Houston with you at Yarragadee for 8 minutes.

SPACECRAFT Roger (garble).

CAPCOM And you're five by.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead, Columbia.

SPACECRAFT I forgot to give you a couple of results of the STS checkout. Like to give you some information on page 7-23 dedicated display input checkout values table.

CAPCOM Okay, go ahead.

SPACECRAFT Okay, on both sides of the cockpit, readings were virtually perfect and looked real biased, except for the following, or negligible bias, and this may be negligible too, but I'll give it to you. On the left side, the AMI mach velocity read 20.03, that was low value...

END OF TAPE

SPACECRAFT ...the cockpit readings were virtually perfect with real bias except for the following, or negligible biases. And these may be negligible too but I'll give it to you. On the left side the AMI mach velocity read 20.03, that was low value. The AMI knots or EAS read 302 on high test. The altitude on the AVVI read 303 on high test. That's pretty good, but you can just give that to the guys at the cape or someplace that are interested in that sort of thing.

CAPCOM Okay, Vance, we copy that and we'll pass it along.

SPACECRAFT And the rest of the tests, everything went very nominal. All parts of the test.

CAPCOM Okay, that's great, we're happy to hear that.

SPACECRAFT And SUP never allowed that.

CAPCOM No. Some SUP would have never allowed anything like this flight.

SPACECRAFT That's right. Hey, you can hopefully keep it going that way. You can tell Tucker Pierce that his estimate was probably better than ours.

CAPCOM Okay, we'll pass it along and we concur with that. Keep it going. Columbia, Houston, if Joe is available I'd like to give him some info on the TV pass.

SPACECRAFT Okay, Roy, go right ahead, I'm listening.

CAPCOM Okay, right now we're set up for TV at Goldstone and Mila. The Goldstone AOS is approximately 0 hours 21 minutes and that pass is about 6 minutes long. About a 1 minute break and then we'll pick you up at Mila for 8 minutes.

SPACECRAFT Okay, Roy, we've got the cameras outside, of course. We might have a pretty good view then. We have a camera on the middeck and we'll turn that on and just see what happens.

CAPCOM Okay, Joe, we're looking forward to it.

SPACECRAFT Hey, Roy.

CAPCOM Go ahead.

SPACECRAFT Houston.

CAPCOM Roger, Columbia, go ahead.

SPACECRAFT Make a note that I have been (garble)
unsuccessful in finding my 12 coffees.

CAPCOM Okay, we'll pack you some extra next time.

SPACECRAFT Roy, he's gotten warm several times but he's never
found it.

CAPCOM Okay, way to go.

SPACECRAFT Maybe you can send them up when we come over
Mila.

CAPCOM Columbia, Houston, 45 seconds LOS. We'll see you
at Hawaii at 0 9.

SPACECRAFT Okay, see you there.

PAO Mission Control Houston at 2 days 23 hours 51
minutes mission elapsed time. Columbia has just passed out of
range of the tracking station at Yarragadee, Australia. We'll be
reacquiring over Hawaii in about 17 minutes. Expecting some
television to come down on this orbit number 49 that the Columbia
will be starting shortly. Crew has indicated that they have
their cameras set up and we're not quite sure what the content of
that TV will be. Probably some in cabin and some Earth views.
One of the crewmembers made a comment during the last pass that
things were looking, on a particular test, things are looking
very nominal, very smooth and noted that the SIM SUP or the
person that writes and conducts the simulations premission would
never have allowed things to go quite that smoothly. Naturally,
the simulations they try and throw in as many problems as
possible to give the flight controllers and the crew experience
in solving problems and this flight has gone much smoother than a
typical simulation. Some conversation there a moment ago between
the ground and apparently Bill Lenoir who had indicated that he
was still looking for the 12 packages of coffee that he thought
had been packed for him on this flight. And Joe Allen remarked
that he'd gotten warm a couple times trying to find those but
hadn't found them yet. 2 days 23 hours 53 minutes. Be coming up
on Hawaii in about 15 minutes. This is Mission Control
Houston.

END OF TAPE

PAO ...but hasn't found them yet. 2 days 23 hours 53 minutes. Be coming up on Hawaii in about 15 minutes. This is Mission Control Houston. Mission Control Houston. Have acquisition of signal thru Hawaii now for several minutes.

CAPCOM Columbia, Houston with you at Hawaii for 8 minutes.

SPACECRAFT (garble) and Roy, that TV pass is at Goldstone, did you say?

CAPCOM That's affirmative, Joe. Coming up at about zero hours 21 minutes.

SPACECRAFT Okay, be sure you're ready. We'll try to be.

CAPCOM Okay, we'll work on it.

SPACECRAFT test

CAPCOM Columbia, Houston. We're 30 seconds to LOS and we'll be picking you up at Buckhorn at about 2 0.

SPACECRAFT Roger.

PAO Mission Control Houston. We have a brief gap here between Hawaii and continental United States. We saw just a brief preview of the TV we'll be getting over the states here in about a minute and a half. Columbia's on orbit number 49 here, and we're a little bit over 3 days into the mission. Standing by for reacquisition over the U.S. in about a minute and 20 seconds. This is Mission Control Houston.

CAPCOM Columbia, Houston with you at Buckhorn for about 8 minutes.

SPACECRAFT Roger Houston, and the radiators are stowed.

CAPCOM Okay, Vance, thank you. We see it.

SPACECRAFT And Roy, do you have your TV set up yet?

CAPCOM We've got it all set up, I think we're still waiting on Goldstone. I'll let you know in a second.

SPACECRAFT Okay.

CAPCOM Okay, Joe. We've got it, we're ready to go.

SPACECRAFT Stand by

CAPCOM Okay, we've got a good picture.

SPACECRAFT Do you have a picture, Roy?

CAPCOM Yes, you must have missed the comment, we've a good picture down here.

SPACECRAFT Uh-oh.

CAPCOM Yeah, looks like we just had a little problem, Joe. Doesn't appear to be in our set though.

SPACECRAFT I think we may have sent you the wrong picture. Hang on a second Roy, we're trying. Hey Roy, how do you hear the middeck?

CAPCOM Your loud and clear and a good sharp picture on the middeck.

SPACECRAFT Okay, Roy. We have a classic picture here of the strawberry drink straw got left open inadvertently and you see it migrated down and formed a bubble. I am going to endeavor to try and suck up that bubble.

CAPCOM That's a very interesting example of crew coordination.

SPACECRAFT Bob's also good at changing cables! He's the chief officer in charge of mopping up the condensate.

CAPCOM I was going to say if we have a problem with the slurpper we know where to go.

SPACECRAFT And he works pretty well, Roy, as you could see. But that was an honest failure, I had filled that up and forgotten to flip the closeout on that straw. So you can see we've got the rest of it all set up for lunch meal here. I guess Vance is going to get served (garble) we're pretty free to move around as you can tell. You see I've got the IFM drawer open down here, and I've got the, on my knee here, the tool caddy, we're getting the tools ready for the DEU changeout problem. Hey Roy, except for the (garble) here in the ceiling, it makes a better floor here than the floor.

CAPCOM Roger.

SPACECRAFT It still looks like the ceiling. Oh, and here's a message from Samantha Lenoir, I think

END OF TAPE

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SPACECRAFT Roy, except for the (garble) the ceiling makes a better floor here than the floor.

CAPCOM Roger.

SPACECRAFT Except it still looks like the ceiling. Oh there's a message from Vance and Lenoir I think.

CAPCOM That's a beautiful picture! Columbia, Houston, we've got a good picture and no voice.

SPACECRAFT Oh Houston, hi. Roy, do you still have the TV and air to ground?

CAPCOM Roger we've got a good picture, which one's Lenoir?

SPACECRAFT Thanks Roy. I couldn't have said it better myself. I'm the barefooted one.

CAPCOM Okay, we've got it now.

SPACECRAFT And Roy the Sun is just rising, let's take a look outside and see if we can see anything.

CAPCOM Okay, we've got a good shot outside now.

SPACECRAFT Roy, we can't look into the Sun very well, it's, I think we're getting reflections off the internal lenses of the TV, but there's a gorgeous, gorgeous Sunrise and you'll see it come up brighter and brighter on Columbia.

CAPCOM Roger, we can see that Joe, we have a good picture of the payload bay.

SPACECRAFT We're looking forward to going out there tomorrow, it looks like it needs some dusting and cleaning.

CAPCOM Well we can't wait for that activity either and we'll be with you early in the morning to get started on that.

SPACECRAFT The early is almost the night before, isn't it? Meanwhile on the middeck, our trusty commander and pilot are having their noon time meal.

CAPCOM Roger Joe, and we're losing the picture now, we'll pick you up in Mila in about a minute and looks more like a luxury cruise.

SPACECRAFT Well we're working hard, we'll see you in about a minute.

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CAPCOM Roger that. Columbia, Houston, with you through Mila for 8 minutes and we have a picture again.

SPACECRAFT Was there (garble) in that. This will be the first of many (garble) on future missions. Somebody's upside down, don't know who. We're not much on talking but we can sure eat a lot. These are stewed tomatoes and notice they don't come out when you turn them upside down.

CAPCOM Well it looks like a cozy little home. Joe, I didn't know we packed a tropical uniform?

SPACECRAFT We're going over the desert. We just came across Africa and it was warm.

CAPCOM Okay we understand now.

SPACECRAFT I was also on Bill's treadmill earlier. I just didn't have time to get properly redressed. (garble) also guards road crossing. The biggest problem up here is we're always losing things, they float off, and you perhaps find them a day later. I just..

CAPCOM Kind of like the coffee, cream?

SPACECRAFT Yeah, I think that's an intentional. Nobody will fess up to it.

CAPCOM No, we were talking down here most crews mutiny against the commander not the first mate. What's going on?

SPACECRAFT I noticed that. I know that, there may be a message there Roy, I'm not sure. Roy, seriously we have not found the missing sponge envelop, we are still looking for that.

CAPCOM Well we have our crew equipment people working on the transport room so we can beam you up some new equipment, new coffee, and new sponges.

SPACECRAFT Okay, good. Might mention that we found quite a bit of humor in the books that somebody must have put in some jokes and things and I keep coming across these things. I don't believe we've found them all yet.

CAPCOM Are you talking about the FAO procedures?

SPACECRAFT Yeah, that's right. (garble) extra write in

END OF TAPE

SPACECRAFT ... keep coming across these things. I don't know whether we thought of all yet.

CAPCOM Are you talking about the FAO procedures?

SPACECRAFT Yes, thats right. (garble) the extra write in.

CAPCOM Well, I'll pass that along to Mike Coats. I think he had a hand in that or course, Mike's got a new assignment now.

SPACECRAFT Yeah. Well, he sure did do a good job. They - how much time do we have before this pass is over?

CAPCOM We've got about 4 minutes remaining.

SPACECRAFT (Garble). could you see our signs?

CAPCOM We can see the sign, but we can't read it. It's a little out of focus. Okay, we're ... focusing in on it now. All right.

SPACECRAFT (Garble) to fix it.

CAPCOM Well you guys certainly lived up to that motto. Okay, that's a great picture outside. Absolutely gorgeous color down here.

SPACECRAFT And now, we're out over the ocean again, Roy.

CAPCOM Okay, that really beautiful, Joe.

SPACECRAFT The Bahamas, the waters around them have fantastic colors in them. Just all beautiful colors of shades of green and blue.

CAPCOM We can see a part of that down here; very good TV picture today. Okay, Columbia that camera is blooming a little bit, shifting colors on us, probably because of the highlight. And we have just lost your TV picture, be with you for a few more minutes with comm and we all really enjoyed the show this morning and want to thank you for sharing a part of your life with us.

SPACECRAFT And fun for us, Roy, thank you.

CAPCOM And we're looking forward to some TV of the students experiments here in the next couple of passes.

SPACECRAFT Roger that.

CAPCOM Columbia, Houston. We're 30 seconds LOS. We'll see you at Dakar at 47.

SPACECRAFT See you later, Roy. And roger, Roy.

PAO Mission Control Houston, 3 days, 0 hours, 38 minutes, mission elapsed time. Columbia's just past out of range of the tracking stations. During that last pass over the U.S., got some good TV showing the crew enjoying all the comforts of spacecraft. We'll be picking up again in about 8 minutes over Dakar and Ascension. And we're expecting some more TV on each of the next two orbits, 50 and 51.

CAPCOM Columbia, Houston, with you through Dakar and Ascension for 8 minutes.

SPACECRAFT Houston, Columbia, loud and clear.

CAPCOM And your're 5-by.

SPACECRAFT I guess this has probably been reported before a lot on other missions but we're sure seeing a lot of smoke coming from what appears to be brush fires over Africa and at nighttime you can see some of the fires too.

CAPCOM Roger, Vance. Columbia, Houston, we're 20 seconds LOS. Botswana's next at 58.

SPACECRAFT Okay, Roy.

PAO Mission Control Houston, 3 days 0 hours 55 minutes, mission elapsed time, have a ...

END OF TAPE

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CAPCOM Columbia, Houston, we're 20 seconds to LOS, Botswana is next at 58.

SPACECRAFT Okay Roy.

PAO Mission Control Houston, 3 days 0 hours 55 minutes, Mission Elapsed Time. Have a brief loss of signal here, as Columbia passes out of range from the Ascension Island tracking station, be picking up again in about 3 minutes, over Botswana.

CAPCOM Columbia, this is Houston with you through Botswana for 8 minutes.

SPACECRAFT Roger, Houston, loud and clear.

CAPCOM Same here.

SPACECRAFT Roy, Bob has gotten into that IFM cable switch and Bill's up there working with him. We've by and large finished up on lunch. And I'll probably....

PAO Mission Control Houston, 3 days 1.... Yarragadee and crew is beginning to get involved with that display electronics unit cable change out.

CAPCOM Columbia, this is Houston, 20 seconds to LOS at Botswana, Yarragadee at 20.

SPACECRAFT Okay, see you there Bob.

CAPCOM Columbia, this is Houston with you through Yarragadee for 6 minutes, standing by.

SPACECRAFT Okay Bob.

SPACECRAFT Bob, what's the AOS Hawaii time?

CAPCOM Let's see the next Hawaii pass is 0145.

SPACECRAFT And that's the pass that you want the student experiment's at, is that right?

CAPCOM Yes sir, that's it.

SPACECRAFT Bob, this is Joe, how do you read?

CAPCOM Loud and clear Joe.

SPACECRAFT Okay, we're behind a little bit in the time down here, and what I think I'll do, if it's okay with you all is, we'll talk about the convection in, I'm sorry, about the

formation of crystals and growth of porifera and get them started and then I'll have to postpone slightly the convection in zero g, because we've got to get that set up, move treadmills and all sorts of things like that.

CAPCOM Okay Joe, we understand.

SPACECRAFT And Bob, if you got a second, I wonder if you could take a question and run it by Frank Janes.

CAPCOM Ready to copy, go ahead Bob.

SPACECRAFT Okay, I understand the procedure for the DEU swap over of the cables. I wonder if, the way I would like to do it is the way you do a car, or something like that, is I would propose a swap connector for connector. In other words, take the connector off DEU 2 and then put it over to DEU 4, one at a time so that I don't have to mark each one with tape and mark the J number etc., I think there might be enough cable to allow me to do that. With power off the DEUs I assume it would be okay, but I would like that to be confirmed that I could that if I want to.

CAPCOM Okay Bob, we'll check with the IFM folks and with the DPS folks and see if any of them have a problem with that.

SPACECRAFT Did you understand what I would like to do? Just swap cable for cable as I go.

CAPCOM Yes sir, that's clear.

SPACECRAFT With any of them back on the broken BEU.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead.

CAPCOM Concensus here is that it's okay to change connector for connector, with the (garble) when you get down to changing connectors 8 and 10, they are wire wrapped pretty close together so you change them as a pair.

SPACECRAFT Okay. I just think I'd like to do that, I think it will save us some bother, especially since we're not moving the DEUs at all.

CAPCOM Sounds like a great idea to me.

SPACECRAFT It's just a typical Saturday in the Overmyer household working on my cars.

CAPCOM Yes sir, sounds like you've got your firing order messed up on your distributor just like I have, huh?

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SPACECRAFT That's right. When we get the DEU changeout, we're going to jump right into the water surge thing, Bob.

CAPCOM Okay, Bob we copy that.

SPACECRAFT Had a little concern a little while ago much of the water coming up around the LiOH cannisters here was quite yellow. Hoping somebody just spilled their lemonade.

CAPCOM Yes sir, I understand.

CAPCOM Columbia, we're 30 seconds to LOS, we'll talk to you next through Guam, at 0132.

SPACECRAFT Okay Bob.

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CAPCOM Columbia, we're 30 seconds to LOS. We'll talk to you next through Guam at 0132.

SPACECRAFT Okay, Bob.

PAO ...involved with the display electronics unit cable changeout. Allowed about 2-1/2 hours in the timeline for that for the commander and the pilot and mission specialists are working on the convection currents student experiment. We're expecting to get some TV on that, I guess as we come up on Hawaii. That's in about another 18 minutes at 3 days, 1 hour, 26 minutes. This is Mission Control, Houston.

CAPCOM Columbia, this is Houston with you through Guam for 7 minutes.

SPACECRAFT Okay. We're with you Houston.

CAPCOM Joe, could you give me some estimate on how long it will take you to get the convection experiment set up?

SPACECRAFT We don't Bob. I don't know. We'll, are you looking at trying to get the TV?

CAPCOM Yes. We've got a young scientist by the name of Scott Thomas up here in the MOCR with us now that's mighty interested in seeing that, but just don't want to interfere with your flow.

SPACECRAFT Oh, I understand that and as soon as we finish the first pass I'm going to start on the experiment and with every AOS I can give you a report even if we don't have a visual on it.

CAPCOM Okay. Mighty fine Joe.

SPACECRAFT I'm glad the expert's there though.

CAPCOM Joe, is there any chance of giving us TV on rev 51 of the convection?

SPACECRAFT What's MET on that, Bob?

CAPCOM Standby Vance. It looks like about, say 3 hours and 19 minutes or so. Columbia, we show an AOS at Hawaii for that rev 51 pass as being 0321.

SPACECRAFT Joe says he can have it by then.

CAPCOM Okay. Mighty fine.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead Houston.

CAPCOM Yeah Bob, we still see some power on DEU 4. Just a reminder that before you start pulling cables on that guy, we'd like to get the power off of it.

SPACECRAFT Yeah. We understand. Bob left the power on while he was pulling that front panel off, then he's going to kill the power.

CAPCOM Okay. We understand.

CAPCOM Columbia, Houston. 30 seconds to LOS at Guam. Hawaii is next at 32.

CAPCOM Make that Hawaii at 45.

CAPCOM Columbia, this is Houston with you through Hawaii for 8 minutes.

SPACECRAFT Okay Houston. Loud and clear.

SPACECRAFT Okay, and Houston, do you see our TV now?

CAPCOM That affirm Vance. We've got a good TV picture.

SPACECRAFT Okay, Dr. Allen is in the wings here and he'll be on stage in about 2 seconds.

CAPCOM Houston, this Joe. Do you read me?

CAPCOM Yeah Joe. We've got you loud and clear. Watching you over there, over by the lockers.

SPACECRAFT Okay Bob. As you know this is a space shuttle set of lockers we have over on a different side of the spacecraft behind the dedicated flight instrumentation here. We're carrying on this flight 3 different student experiments which is a lot of fun for us to carry and we're very pleased to have a chance to carry them. I thought I'd just briefly run through what they are. They're in these 2 lockers and in the top of....

END OF TAPE

SPACECRAFT ...the first is an experiment that belongs to Michael Issel of Wallingford Connecticut. Michael's a freshman at American University now, but was in high school when she suggested this. It's an experiment right here and it is a growth of a crystal experiment in 0 gravity. Since it's in 0 gravity, I don't want to move it out and shake it because the crystal is forming right now. We turned on shortly after we got onto orbit here and I won't move it out and I'll be very careful when I move this one above it. The 2nd experiment is this one which officially called, or known as the growth of porifera experiment. It's really growing sponges if you will. They don't look much like sponges, but they are a sponge solution and it is an experiment proposed by a young man named Aaron Gillette from Winterhaven, Florida. Aaron has a theory that sponges grow using the force of gravity to help them, and we're testing that by permitting sponges to grow here, if they will grow, but perhaps without gravity, they won't grow so well. We have started a number runs. I thought I would start what Aaron calls run number 5 right now, which consists of releasing a special kind of growth chemical into the sponge solution and I will do that right now and please note, please note the Mission Elapsed Time so that Aaron can put that into his log book.

CAPCOM Joe, we've lost your audio.

SPACECRAFT Okay. I've started 2 samples from run number 5. This is sort of a two-handed job right now is the problem. And this is the 3rd sample. Okay Bob, we've done that part of Aaron's experiment. I'm going to leave it now. We'll come back, I'll come back several times during the rest of the mission to start still other runs and then he'll examine the sponges when we return to planet Earth later on. Let me close this up now very carefully. Bob, the 3rd experiment is quite a complicated one contained here. It has to do with convection, or the motion of fluid in 0 gravity. And I'll disappear momentarily pull it out and get an initial look at it, show you an initial look at it.

CAPCOM It looks like a rather sophisticated piece of gear Joe.

SPACECRAFT Roger that. (garble). We'll snap this down to the floor and then use a series (garble) placed in heater pans to see if fluid in 0 g convects, that is that they move themselves in the way it does at 1 g and, of course, we think it will not and indeed it should form patterns that are quite dissimilar to what we see in similar experiments on Earth. We don't know exactly what to expect. We're going to set this up right now and we'll report back to you as soon as we can. This is an experiment that was suggested by Scott Thomas and I am pleased that Scott's with you right there right now and if I have any questions, we'll be talking to you very shortly over the next few hours.

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I'm reminding you that Scott's from Pennsylvania, Johnstown,
Pennsylvania and is now in Richland High School. He was in
Richland High School. He's now a freshman at Utah State
University.

END OF TAPE

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CAPCOM Okay, Joe. We've got 20 seconds till LOS. It'll be a short LOS about 2 minutes and we'll see you at Goldstone.

SPACECRAFT Okay, Bob. Look forward to seeing you later. And let me see about getting this ready. We'll report back shortly.

PAO Mission Control Houston, 3 days 1 hours 53 minutes mission elapsed time. Just completed that pass over Hawaii where we got some downlink television of mission specialist Joe Allen reviewing the student experiments onboard. We have 3 of the students experiments and 1 of the student experimenters is here in mission control this morning watching that. Scott Thomas who's experiment was explained there at the last convection in zero-g and Mr. Gil Moore of Cycall, Utah. Mr. Moore is the was the purchaser of the first getaway special which had experiments about 9 student experiments, from Utah State University that flew on earlier Shuttle flights. We'll be reacquiring in about 45 seconds as Columbia passes over the western edge of the tracking stations in the continental United States on orbit number 50. 3 days 1 hours 54 minutes mission elapsed time. This is Mission Control Houston.

CAPCOM Columbia, this is Houston. We'll be talking to you through Buckhorn for about 8 minutes.

SPACECRAFT Roger, Houston, Buckhorn.

SPACECRAFT Tom, would you remind me which of those 2 connectors you felt I had to flop simultaneously.

CAPCOM Bob, those are J8 and J10. No problem in recognizing them. They're just wrapped too closely together in 1 wire bundle for you to move them separately.

SPACECRAFT Okay, understand.

CAPCOM That's just a physical wrapping constraint, not any problem. Okay, Columbia. We got a TV picture now through Goldstone.

SPACECRAFT See a good picture. (garble) everything has to be somehow tied down here, we're using the famous gray tape to tie down the experiments.

CAPCOM Roger that. I don't think the world could function without gray tape of some sort.

SPACECRAFT That's right. That's why it makes it really harder to do a lot of things up here because you can't ever really use two hands unless you somehow have yourself tied down too.

CAPCOM Columbia, this is Houston. We're ready for the APU cooling system off now.

SPACECRAFT Okay, Houston, we'll get that for you. Okay, check pan heat thumbwheel 0000. Check experiment power off, heater select 1, heater off, (garble) heater, off.

CAPCOM Joe, when you get around to it, I'd like you to check over on the pans also.

SPACECRAFT Say again.

CAPCOM I'd like you to check the acoustics on the pans over there when you get a chance also.

SPACECRAFT Okay. Bob, I think it's coming on. It's interesting that the orbiter is noisy enough, it's really very hard to tell but we think it's there. Okay, Joe, let's repeat for (garble) 2 (garble) select 2 and (garble) on.

CAPCOM Columbia, we're 2 seconds to LOS. We'll be leaving Goldstone.

SPACECRAFT Okay, (garble) 2 is definitely there.

SPACECRAFT Roger, Goldstone.

SPACECRAFT Heater select 0. Experiment power on, check the lights on. Check TV set up before starting.

CAPCOM Columbia, we're back with you through MILA for about 3 1/2 minutes of picture.

SPACECRAFT Okay. And Bob, we're saying that...

END OF TAPE

CAPCOM Columbia, we're back with you through Mila for about 3 and 1/2 minutes of picture.

SPACECRAFT Okay.

SPACECRAFT And Bob, we're setting up the other TV now, so we can record the data.

SPACECRAFT And Bob, Columbia. Please repeat that last thing you gave me about 5 minutes ago, I got busy with the TV and I couldn't ...

CAPCOM Okay Vance, the only thing we wanted was get the APU cooling system off on panel R2.

SPACECRAFT Okay.

SPACECRAFT It's off Houston.

CAPCOM Okay Vance.

SPACECRAFT And Bob, are we cleared to turn payload Aft main B off?

CAPCOM Okay Vance, your go on that.

SPACECRAFT Thank you.

CAPCOM Vance, if you get a chance, we're ready for the APU controller pwr off, also.

SPACECRAFT Roger.

SPACECRAFT It's off.

CAPCOM Columbia, this is Houston. We're taking control of your camera here for a bit.

SPACECRAFT Bob, if you want it pointed differently, just holler.

CAPCOM Okay Bill.

CAPCOM We're 20 seconds to LOS, we'll talk to you next through Ascension at 0224.

SPACECRAFT Okay, very good.

SPACECRAFT We'll see you there and next stateside pass, we should be ready with some good TV here.

CAPCOM Outstanding.

CAPCOM Columbia, this is Houston with you through Ascension for 5 and 1/2 minutes.

SPACECRAFT Okay Houston, just made a fantastic pass right along the coast of South America, and entering the South Atlantic anomaly at this time, be passing over South Africa shortly.

CAPCOM Okay, we show your well clear of the South Atlantic anomaly, so no need to worry about the microwave oven on this pass.

SPACECRAFT Okay, we'll take off our shielding then.

SPACECRAFT Bob, you might have them get ready a fourth, oak leaf culture for Bob's male dexterity award.

SPACECRAFT This one can be for real, looks like he has succesfully swapped out the DEUs.

CAPCOM We were all worried about that Bill knowing who was changing it.

SPACECRAFT Okay, I think we have enough band aids on board.

SPACECRAFT Bob, we just took a VTR TV coverage of the East coast of South America from Venezula to the Eastern tip of Brazil.

CAPCOM Ought to be spectacular, looking at your ground trace here on the plot board.

SPACECRAFT And we got good Hasselblad coming through the whole pass too. And Bob this is the friendly PLT up here and if I can be serious for a moment, I would like to say yes we got the DEU swap over done, and we do have my DEU for landing which is a great help for me, I'd like to express my appreciation to an awful lot of guys who worked awful hard on that in flight maintenance down there. A couple of names come to mind immediately, of course, Frank Janes, and Bill (garble) down there in CF and I sure do appreciate their words and their training effort, and I think we did some good work. So I'd really like to pass on some good thoughts to those guys. Okay?

CAPCOM Okay Bob, we'll pass them on, and all of us down here feel a little bit more comfortable with 3 CRTS in the front for entry also. While we've got you on this pass, we'd like to have either Joe or Bill check that middeck experiment on the convection flow and make sure that that box is securely taped down on all four corners. The experimenter here says that is

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very critical to his experiment, make it as rigid as possible on the floor.

SPACECRAFT Okay, Bob, we'll do that. Let's say it's in work.

CAPCOM Okay.

SPACECRAFT Bob, I Tell Scott no bumps, no jiggles.

CAPCOM Okay Joe, he has been informed.

END OF TAPE

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SPACECRAFT Bob, one thing I did notice, on both the DEU's there's an air, (garble) filter screen, apparently some sort of air flow by them on each side and both those screens are just completely clogged with wind. There is virtually no air flow going on in either DEU.

CAPCOM Bob, did you get them all cleaned out while you were in there?

SPACECRAFT Yes sir.

CAPCOM Mighty fine.

CAPCOM And Bob, did you have any trouble with getting cables tangled up as you were making that one for one swap?

SPACECRAFT Okay, it worked fine. I had to, I had to cut a number of tie wraps probably more than you expected, but that made them break free. It really wasn't any problem at all. One for one.

CAPCOM Okay. We might have to work on changing that procedure then. That sounds like a pretty good idea and not have to tag all that stuff.

SPACECRAFT It sure made it a lot faster, I guarantee you that.

SPACECRAFT As far as I'm concerned, Bob, Bob Overmyer gets the repairman of the week award. We're sure glad to have those 3 tubes when entry time comes.

CAPCOM Yeah. We'll second that.

SPACECRAFT It's the first I've seen (garble) a very good trip.

CAPCOM I think I heard Paul Harvey once say that the best apples grew under the tree that had the most sticks under it.

SPACECRAFT We have to let Bob answer that one.

CAPCOM I'll explain it when you get back down.

SPACECRAFT (garble)

CAPCOM Columbia, we're about 5 seconds to LOS. Talk to you next at Botswana.

SPACECRAFT Okay. See you there.

PAO Mission Control, Houston. 3 days, 2 hours, 31 minutes Mission Elapsed Time. Columbia in a brief gap between the Ascension Island tracking station and the one at Botswana.

Will be reacquiring in about 3 minutes. Bob Overmyer on that last pass reported that he has completed the replacement of the display electronics unit which will enable him then to have 3 operable CRT's or display tubes up on the flight deck for entry. That procedure was done in about half the time that was allotted for it during the, in today's crew activity plan and he complimented some of the procedures people on the ground who worked out the operations for that changeout. We've been seeing some television of some of the student experiments, particularly the convection in 0 g and Joe Allen primarily working on that one. Columbia is currently on orbit number 50 and we would be expecting a little bit more television on orbit number 51 in about an hour. 3 days, 2 hours, 33 minutes Mission Elapsed Time. This is Mission Control, Houston.

CAPCOM Columbia, Houston with you at Botswana for about 2 minutes.

SPACECRAFT Roger Houston.

SPACECRAFT And Roy, behind Panel R17, which I can reach behind, I was able to, I believe it's the video switching unit there, or else it's a DDU 3. The air filters on it also very, very clogged. Heavy with lint and I went ahead and cleaned those off as far back as I can reach my hand.

CAPCOM Okay. We copy Bob.

SPACECRAFT I guess looking at it, it's DDU 3 is what I was doing it to.

CAPCOM Sounds like we need to vacuum all those filters.

SPACECRAFT They are really heavy with lint. Very heavy.

CAPCOM Columbia, Houston, we're 30 seconds LOS. Guam is next at 06.

SPACECRAFT Copy.

END OF TAPE

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CAPCOM Columbia, Houston. We're 30 seconds LOS. Guam is next at 06.

SPACECRAFT Copy.

PAO Mission Control Houston. 3 days 3 hours 5 minutes mission elapsed time. Columbia about to pass within range of the tracking station at Guam. Orbit number 51. We do have some TV scheduled as they pass over Hawaii in about another 15 minutes. This is Mission Control.

CAPCOM Columbia, Houston. With you at Guam for 8 minutes.

SPACECRAFT Hi Roy. Joe is down in the middeck working on the convection experiment right now and the other three of us are helping him.

CAPCOM Sounds like you got plenty of help on that one.

SPACECRAFT I'm sorry, Roy. How do you copy now?

CAPCOM Okay, your 5-by and we copied all that.

SPACECRAFT And Roy, I need all the help I can get. It's very interesting. I checked the pan and all those without exceptions, the (garble) doesn't go flat between the plate but rather it stays atmospherical, almost spherical and it will - the surface tension is just not enough to pull it out flat and 2 of the plate now I've got a - basically a cylinder of fluid that drains in top and bottom plate and yet it does not touch on the side if you know what I mean. Around the side of the cylinder. It's most peculiar.

CAPCOM We're anxious to see a picture of that, Joe. But good description and I think I can understand what you are saying.

SPACECRAFT What site are you talking to us through right now?

CAPCOM We're talking through Guam now.

SPACECRAFT Okay, we got them on video tape. We can ship you later maybe some live even.

CAPCOM Okay, Joe. I guess we were planning on getting live TV at Hawaii coming up at 20.

SPACECRAFT Okay, Roy. Joe's using both hands right now so I'll answer for him. You know what? Houston, this is Columbia, over.

CAPCOM Columbia, Houston. Go ahead.

SPACECRAFT Roy, I think we may be learning more about convection and the behavior of the fluids than maybe we wanted to know. When the fluid is injected in once again it stays atmospherical. I can give it to - inject very very slowly, the minute the upper part of it touches the top plate, the fluid then crawls over the top plate to form a circular pattern there till we wind up with a solid geometrical figure that is circular at the top circular at the bottom with a tapered wait inbetween. Now and that's happened on 3 of the 6 pans. Now, I've continued with the convention try as yet and I'm on pan 7. We've seen no head of a convention pattern whatever. Which may be what we might have expect.

CAPCOM Okay, Joe. Thanks for the comments. The experimenter is evaluating your comments and we may have some recommendations for you here in a few minutes. Columbia, Houston. Joe, where are you in the sequence now? What number?

SPACECRAFT Okay, Roy. We've just finished sequence Charlie. We're about to search sequence Delta.

CAPCOM Roger, we copy. And Columbia, Houston. On this next sequence we would like for you to insert the needle so that it is pointing down toward the wall and inject it very slowly such that the fluid would impact the wall ...

END OF TAPE

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CAPCOM And Columbia, Houston, on this next sequence we would like for you to insert the needle so that it is pointing down toward the wall, and inject it very slowly, such that the fluid would impact the wall with a very low velocity as you're putting it in.

SPACECRAFT Okay Roy, I understand that. We have injected the fluid very, very slowly, and believe me it - the surface tension loses the battle with, I should say the (garble) action loses the battle with the surface tension. I will however try to inject it along the wall to see if I can't force it around the wall.

CAPCOM Okay Joe, and we're going LOS, and we'll see you at Hawaii at 21.

SPACECRAFT Okay.

SPACECRAFT Just helping Joe.

PAO Mission Control Houston, 3 days 3 hours 15 minutes, Mission Elapsed Time. We had loss of signal with Columbia through the Guam tracking station. We acquire over Hawaii in about 5 minutes, we're hoping to get some Television.

CAPCOM Columbia, Houston with you at Hawaii for 8 minutes, and we have a TV picture.

CAPCOM Columbia, Houston while your adjusting the TV, if there's someone on the flight deck, I'd like to put in a request.

SPACECRAFT Go ahead.

CAPCOM Roger, we'd like to have a GNC SPEC 1 for some variable parameters and we'd like you to do a SPEC 21 in resume and get the star trackers working again.

SPACECRAFT Okay.

CAPCOM And Columbia, Houston, we need for you to leave up SPEC 1 for a while, while we send them up.

SPACECRAFT Okay Roy.

SPACECRAFT Roy, how long are you with us at this time?

CAPCOM We've got you for about 5 more minutes Joe.

SPACECRAFT Okay, what TV (garble) call that now?

CAPCOM Okay, we're looking at the experiment. And Columbia, Houston, Vance, we would like for you to leave a GNC SPEC 1 up on the CRT for awhile.

SPACECRAFT SPEC 1.

CAPCOM Thank you.

SPACECRAFT Okay Roy, a couple of comments about the experiment. We injected the liquid as you said, it is amazing as liquid is injected it will grow what looks to be a blister and whatever side of the clump of liquid is already there. The blister has an amazing memory that is to say, it stays for a long long time, and the curved surface that is here right now as has property of reflecting light almost any direction back into the TV, so it is very difficult to get a reasonable picture, TV picture. However, if you can see number 2, I think we have the start of a very strange convection started here. It has 3 ridges along it, it's very unlike the source of convection patterns that are seen on the ground, however, very unlike it, almost looks to be the reverse. And his heaters lights have gone out now, we'll continue to take data on pam 1 and 2 for another minute before we go on to the next run.

CAPCOM Roger Joe, we have a fairly good picture of that. We'd like to know which pan is being heated currently.

SPACECRAFT Okay, I'll put my finger beside the two pans that up until a moment ago were being heated.

CAPCOM Okay, we see those.

END OF TAPE

CAPCOM Okay. We see those.

SPACECRAFT I'm pointing to pan 1 and 2 and during the heating process, the ridge that you see along pan 1, and let me trace it with my finger.

CAPCOM Okay. We can see that very well Joe.

SPACECRAFT Okay. That ridge grew during the time it was heated. Now the heating has stopped, the lights are out at the moment. Pan number 2 has 3 ridges that met at the center and let me outline them.

CAPCOM Okay. We see that also, Joe, very well.

SPACECRAFT It's a really most peculiar behavior.

CAPCOM Columbia, Houston, the experimenter would like for you to tap the side of the box so that we can record the behavior.

SPACECRAFT I'll do that, but I promised him no bumps or no jiggles.

CAPCOM Okay.

SPACECRAFT Roy, if you're here for another minute. Let me try to inject pan number 3 and just watch the injection go in.

CAPCOM Okay. We've got you for just exactly a minute. And actually, if you wanted to wait, we will be coming up over Goldstone and we'll have about 3-1/2 minutes there. Okay, we see it though. Go ahead. Do it towards the wall Joe. Okay. We're going to lose you now and we'll pick you up at Buckhorn at 30.

PAO Mission Control, Houston at 3 days, 3 hours, 28 minutes. Columbia is just out of range and we've lost the TV picture coming over Hawaii. We'll catch the edge of the Goldstone station in about a minute and 45 seconds. Mission specialist, Joe Allen, obviously taking great interest in the student experiment, convection of this heavy viscosity oil that they're injecting into the units on this experiment. This particular experiment requires a bit more time than the other two, one of which occasionally requires that they attend to the sponges and then mostly leave them on their own and the crystal unit which pretty much is turned on and left to grow. We're on orbit number 51 at 3 days, 3 hours, 29 minutes and we will reacquire communication in about a half a minute or so. This is Mission Control, Houston.

CAPCOM Columbia, Houston with you at Buckhorn for 5 minutes.

SPACECRAFT Okay. We got you.

CAPCOM Okay. You're 5-by.

SPACECRAFT (Garble). Roy, let us know when you get TV through Goldstone.

CAPCOM Roger. I'll let you know when we're configured. We still don't have a picture yet. Okay. We have a picture now.

SPACECRAFT Okay Roy. I'm going to continue injecting 3. Okay Roy. I've managed to inject 3. It is completely around the pan now. Pan number 4, by the way, is one of those that grew the mushroom (garble) and I'm going to inject E4 into it but the mushroom just grows inside and then I will start this (garble).

CAPCOM Okay Joe. We copy.

SPACECRAFT And you'll notice, perhaps you can see that the surface tension inside, the resistance to it spreading is so great that the liquid would prefer to walk back up the needle of the syringe and out the hole than enter the pan and that's basically what it's doing here on pan 4. I think in order that you see (garble).

CAPCOM We hear you Joe. Go ahead.

SPACECRAFT Okay. I think in order that you maybe see this, I'm going to go ahead and start this (garble) and we'll see what happens to pans 3 and 4. I'll continue to try and check pan 4 while the heaters are running.

CAPCOM Okay. That sounds good Joe. We've got about 2 minutes of TV left. Okay Joe. About a minute left.

SPACECRAFT (Garble).

END OF TAPE

CAPCOM Okay, that sounds good, Joe. We got about 2 minutes of TV left. Okay, Joe. About a minute left.

SPACECRAFT (garble) adjusting the numbers. Roy, on (garble) and 3 which is the interesting one.

CAPCOM Okay, we see it, Joe. Okay, Joe. We lost your picture and we'll be going LOS in about 45 seconds and then we'll pick you up at Botswana about 10 after.

SPACECRAFT Okay, I'll keep you posted and we'll finish this experiment shortly, bring the data tapes home and we can talk about it later.

CAPCOM Okay, well that was great letting us participate in the experiment and thank you very much.

CAPCOM Columbia, this is Houston. With you through Botswana for 7 minutes.

SPACECRAFT Okay, loud and clear.

CAPCOM And Columbia, for Bob we'd be interested to know the outcome of the DEU checkout SSR 14 if you've done it yet.

SPACECRAFT Say again please. I guess I didn't do it yet, Bob. All I did was turn on the C - all I did was turn on the CRT and it worked and its called up specs and its working fine. I haven't done anything else.

CAPCOM Okay, Bob. When you get a chance, we would like to go ahead and do this SSR14 just to get a full complete checkout of the system, make sure it's talking to all the keys and everything is going okay.

SPACECRAFT I'm sorry I missed that, Bob. I got doing that ARS inspection by the way. And we (garble) and found about 2 or 3 ounces of water, thats all nothing significant. We mopped that up. To me like the problem area in particular of the why the outer side of those. There was a significant amount of water around each of the ducts on the exterior of the ducts right at the marvin clamps. Looks to me like we ought to tape something that acts as an insulater around those clamps and around that rubber to help stop the condensation there. Thats probably just condensation is what it is.

CAPCOM Okay, Bob. EECOM was listening in on that and he's copied.

SPACECRAFT I don't know what we've got onboard that we might be able to tape around there. Maybe a towel or something like that anything to cut the airflow down on that cold metal or that

cold rubber. And Roy, we're getting the COAS up for that COAS align and we'll get on that DEU checkout as soon as we get those COAS align.

CAPCOM Okay, sir, sounds fine.

SPACECRAFT And Roy, are we clear now at the terminator to maneuver to that COAS CAL attitude? We didn't have a time to start maneuver. Houston, Columbia.

CAPCOM We - stand by Columbia. We're checking right now. Columbia, you'll be clear to go to COAS align attitude at sunset.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Roy, according to the (garble), the way it came up we're going to do this minus Z COAS CAL without doing an IMU align first. I just wanted to make - check to make sure that's the way you wanted it.

CAPCOM Columbia, Houston. Yes, we'll go ahead and do the COAS CAL without the IMU align this time.

SPACECRAFT Okay.

CAPCOM Vance, we feel pretty comfortable with this COAS align without the IMU align because you got 3 pretty good IMU's onboard right now.

SPACECRAFT Good.

END OF TAPE

CAPCOM Vance we feel pretty comfortable with this COAS align without the IMU align because you got 3 pretty good IMUs on board right now.

SPACECRAFT Good.

CAPCOM And Columbia, we're going LOS right now. The next pass will be Indian Ocean at about 0422.

SPACECRAFT Okay, see you at 22 very soon.

PAO Mission Control Houston, 3 days 4 hours 21 minutes Mission Elapsed Time. We'll have a brief pass over the Indian Ocean station in about a minute. The crew at this time is scheduled to be doing a crew optical alignment system calibration, and they have about a ten minute maneuver to line up for that. That's part of the system that allows the crew to use some of their own resources to make navigation sitings if that were to become necessary, sort of a back up system. I believe it was Bob Overmyer reported in the area around the lithium hydroxide cannisters they found about 2 to 3 ounces of water floating around, which they believe is condensate on some cold equipment down there, and he said they mopped that up. At 3 days 4 hours 22 minutes, this is Mission Control Houston.

CAPCOM Columbia, this is Houston with you through Indian Ocean station for a very short pass, and we'd be interested to know how the pan 3 heating experiment came out.

SPACECRAFT Okay Roy, stand by on that, I've got about a 3 handed job going right now.

CAPCOM Columbia, Houston, we're at 20 seconds...

SPACECRAFT Okay Roy, can you hear me?

CAPCOM Yes, go ahead Joe, got about 15 seconds.

SPACECRAFT Okay this is Bill, we just finished sequence Mike, sequence Juliet showed some interesting (garble) patterns with essential with a central (garble) toward the end.

CAPCOM Okay we copy Bill, thanks for the info.

CAPCOM Columbia your going AOS, LOS, Guam will be next at 0620.

SPACECRAFT I'll see you there.

PAO Mission Control Houston, just had loss of signal with Columbia through the Indian Ocean station. Starting orbit

number 52 shortly, and we'll reacquire over Guam in about 17 and 1/2 minutes. This is Mission Control Houston.

CAPCOM Columbia, this is Houston with you through Guam for 7 minutes.

SPACECRAFT We copy.

CAPCOM And for Bob or Vance, I've got some changes to the CAP for you. For the (garble) duty cycle burns, be ready to copy.

SPACECRAFT Can you wait on that a second, we're just finishing up the COAS CAL, say Bob we'll give you the data in a minute, but as hard as we tried, best we could get on the COAS CAL back here, and (garble) was dead center on the COAS (garble) about 3 different times and it was consistant at .14, .14 that was after we excepted the first large one at .40. We centered it up and it was dead center, and for the best my eye could see it was dead center, it kept coming up .14.

CAPCOM Okay Bob, we understand.

SPACECRAFT And Bob, while you're waiting for them, let me give you the final count here on the convection experiment, do you copy?

CAPCOM Okay, go ahead.

SPACECRAFT Okay, I'm finishing it up now on the last sequence, this is Bill, I've got through the bottom and I did the sequence Papa, I am now repeating sequence November, when I first did sequence November I had set the jitter select to 4 but neglected to turn it off. So, in case there was some kind of an internal sequencer, I went ahead and finished Papa as advertised, and have come back and finished up November now, and it's just wrapping up now, over.

CAPCOM Okay, we got a good copy, Bill.

SPACECRAFT I'm not sure it will be on the video tape, and I tried to point to each of the appropriate dishes as the tape started to help you pick it out without the audio.

CAPCOM Alright, mighty fine.

SPACECRAFT Bob, where should we be taking notes, in the CAP, or on a note pad, or in the ops checklist.

CAPCOM I think you can take them directly in the CAP Bob.

SPACECRAFT Okay, what page?

SPACECRAFT Okay, and Bob, I just came up to turn the VTR off and it ran out of tape before we got to the end of the experiment. I'm not sure where.

CAPCOM Okay Bill.

CAPCOM And Columbia, as soon as possible, we need to get back into the track mode and starboard sun. Are you ready to copy on the cap?

SPACECRAFT Sure Bob. We're ready.

CAPCOM Okay. On page 4-66, on the L2U burn, number 3, on the maneuver option, we changed this to roll plus 192. That's on the top of the page Bob. You got that located?

SPACECRAFT Okay. Give me the time after 4-66. (garble) I've got 2 different areas on the page I'm looking at.

CAPCOM Okay. It's at 6:04.

SPACECRAFT Okay. 6:04, maneuver option roll 97.2, pitch 329.7, yaw 332.2.

CAPCOM That's affirm. Let's change these numbers as follows: roll plus 192.0, pitch plus 128.5, yaw plus 311.6.

SPACECRAFT Okay. I understand. That's roll plus 192.0, pitch 128.5, yaw plus 311.6.

CAPCOM Hey, that's a good copy. On the next change, page 4-67, and the time on this burn is 0715.

SPACECRAFT (garble) looking at 0715.

CAPCOM Okay. The new numbers are roll plus 287.5, pitch plus 106.7, yaw plus 291.8. And a 0714 initiate maneuver.

SPACECRAFT Okay. The way I see it you gave me a roll in place of 104. The roll is now 287.5, 106.7, 291.8. Start the maneuver at 0714.

CAPCOM That's a good copy Bob, and we're making these changes in order to buy you a little more daylight for the landing. And after the completion of these burns, we'd like to get the IMU align done as quickly as possible after completion, and we would like to get the IMU done before the daylight which is going to come at about 0754. We'd like to get that IMU done before 0754 and you're free to use normal jets anywhere in this sequence to accomplish that goal.

SPACECRAFT Okay. We understand that and we'll do the best we can to get that IMU align done before we get out into the sunlight.

CAPCOM Okay Bob.

SPACECRAFT And Bob, on the first maneuver you gave us a change to, is the time of burn still 6:25? I mean the time (garble)?

CAPCOM Standby Vance. You're very badly broken up on that one. Could you say it again please?

SPACECRAFT Okay. Is the time to initiate maneuver still 6:04 on the first change data you gave us?

CAPCOM That's affirm. No change on the burn time. Or the initiate maneuver time.

SPACECRAFT Right.

CAPCOM And Columbia, we're going LOS in about 20 seconds. We'll talk to you next through Hawaii at 0456.

SPACECRAFT Bob just reconfirm that that 1st one you read, 192.0 replaced a 97.2 on the roll at 6:04.

CAPCOM That's affirmative. That's the proper place and you'll have a PMC coming up first at Hawaii.

SPACECRAFT Okay.

PAO Mission Control, Houston. 3 days, 4 hours, 50 minutes Mission Elapsed Time. Columbia passing out of range of the Guam tracking station on orbit number 52 and will reacquire in about 6 minutes over Hawaii where the crew has a private medical conference scheduled with the surgeon. They have been working on the crew optical alignment system calibration which is one of the flight objectives and then we'll be putting the spacecraft back in the starboard sun position. At 3 days, 4 hours, 50 minutes...

END OF TAPE

PAO Which is one of the flight objectives, and then we'll be putting the Spacecraft back in the starboard sun position. At 3 days 4 hours 50 minutes, Mission Elapsed Time, this is Mission Control Houston.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead Columbia, this is CAPCOM with you now.

SPACECRAFT Okay, fine. Just want to verify two things with you. Going into the L2U burns, they should be obvious I guess, but I want to double check them. One, we're sitting at the attitude that we want to have for the first burn, and two, you have no time updates like what we'd find on FS5-5 except for the one you gave us.

CAPCOM Okay Vance, I understand the question. Let us check the one update, time update that we gave you is the only one that I know of, we'll check around the room here.

SPACECRAFT When I say sitting at the attitude, I mean sitting in the tracking mode that you want for the first part.

CAPCOM Yes Vance, we see you in the tracking mode, and that one time update was the only one that was intended.

SPACECRAFT Okay, thank you.

CAPCOM And just a reminder before you get into these burns, that we do not want to be interconnected for the burns.

SPACECRAFT Roger, copy.

CAPCOM Yes, you had a procedure on that.

CAPCOM Columbia, we're 30 seconds to LOS, at Hawaii, this will be the last pass for the ascent/entry team today, we'll turn you over to the orbit guys. And Columbia, as you go out of site LOS, we see you in good configuration and good attitude for the burn.

SPACECRAFT Okay, good.

PAO Mission Control Houston, loss of signal at Hawaii, on orbit number 52. The crew now preparing for the aft reaction control system 3 engine soakback test one of the detailed test objectives of this flight. In which thermal conditioning and soakback of three adjacent engine, in the aft RCS system are tested. There affect of the soakback along heat soakback on structural and subsystem components in the vicinity. Next station almost 40 minutes away, Botswana, 39 minutes now, to the

voice relay station at Botswana. This is Mission Control Houston, day 3 5 hours 6 minutes.

CAPCOM Columbia, Houston, orbit team is with you at Botswana for 6 and 1/2 minutes.

SPACECRAFT Stand by, we're just about ready to do this burn. Okay.

SPACECRAFT And Columbia. If your looking at data, you will notice that during the first burn we got good data and everything, we did get a message about right OMS and that was because we were not interconnected but we had not done the item 7 to stop the interconnect calculations, so it thought it was taking it from the OMS when it was taking it from the RCS. And it showed an 8.14 percent out of the right OMS which never happened.

CAPCOM Roger, we copy that, Bob.

SPACECRAFT At this time, we've got the item 7 done so it won't happen.

CAPCOM Okay.

SPACECRAFT I re-state Brian, we were actually not interconnected for that last burn so it's just a matter of that one item number.

CAPCOM Roger Bob, understand.

SPACECRAFT And Brian, I've got the numbers for the first one, if you want them real quick, Delta X was -.05, Delta ZY -.08, Delta ZV was 11.36, that's one one point three six, Delta V total was 123.49.

CAPCOM Roger, we copied that, thanks.

CAPCOM Columbia, Houston, we're about to go LOS for a minute, and we'll see you at IOS.

SPACECRAFT See you there, got another burn off.

CAPCOM Columbia, Houston with you at Indian Ocean for 8 minutes.

SPACECRAFT Roger Brian, and we're setting up for the next maneuver.

CAPCOM Columbia, Houston with you at Indian Ocean for 8 minutes.

SPACECRAFT Roger Brian. And we're setting up for the next maneuver.

CAPCOM Roger Vance.

SPACECRAFT What did you have? (Garble), Brian?

CAPCOM Columbia, Houston. Say again. You were cut out.

CAPCOM Columbia, Houston with a radio check.

SPACECRAFT Here Houston. How do you read?

CAPCOM Roger. Loud and clear.

SPACECRAFT Okay. Did you want the records for burn bravo, DDX is .00, DDY was -.21, BOGY V was 10.86, (garble) was 13.94.

CAPCOM Roger Bob. Copy that.

SPACECRAFT (garble). Brian, you don't have data at Botswana. Okay.

CAPCOM Roger. Columbia, we're at IOS but we're having trouble getting the data. We're reconfiguring right now.

SPACECRAFT Okay. I just wanted somebody to look over my shoulder on the maneuver option on the universal point and make sure that those numbers were what were read up to us as the change to the cap. That's all.

CAPCOM Roger. In that case, since we're not getting data yet. Let's go ahead and verify those over air to ground.

SPACECRAFT Okay. I've got item 5, 6, and 7 for the next maneuvers set up as follows: roll 192.0, pitch 128.5, and yaw 311.6. Over.

CAPCOM Roger that. And that attitude looks good.

SPACECRAFT Okay Brian. That's what I wanted to check.

CAPCOM And Columbia, Houston. Just another word on that, that attitude is a change and it's posigrade burn now.

SPACECRAFT Okay. That's fine as long as we got the right numbers. That's all we wanted.

CAPCOM Roger. They look good to us. And Columbia, Houston, we're seeing them now on our data.

SPACECRAFT Okay. And you notice that item 1 on that spec, that we're going to start it at 6:04 as per the CAP.

CAPCOM Roger. Concur with that Bob.

SPACECRAFT And Brian, I hate to sound like a worry wart but our cap says that that maneuver will be done in B auto vern versus nominal so I assume we're staying in verniers.

CAPCOM And Columbia, Houston, roger that's the cap version but if you feel like you need to get there quicker, use your own judgement on verniers and primarys.

SPACECRAFT Okay. We understand that. As long as we get the maneuver started, we'll get a movement or completion time and we'll compare that using verniers versus normal.

CAPCOM Roger. Concur.

CAPCOM Columbia, Houston with a minute to go to LOS and I have a note on the humidity sep for you.

SPACECRAFT Go.

CAPCOM Roger. Last night we noticed the waste tank quantity built up nicely and what we'd like to do right now and when you've got a chance, to turn humidity sep B off and we'd like to look at its performance before you go to sleep tonight.

SPACECRAFT Okay. You want to take humidity sep Bravo to off. That's -

CAPCOM Roger. And that's so we can take a look and see how A does on its own.

SPACECRAFT Okay. Have you come up with any ideas what we can wrap on that y-duct down there to maybe cut off some of that condensation down here?

CAPCOM Roger. We're going to discuss that down here. We'll get back to you.

SPACECRAFT I was thinking Brian, if nothing else, we could take a couple of old towels we've got and gray tape them around them. That ought to be a little insulation if nothing else. Lord knows, we've got plenty of those.

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CAPCOM Roger. We'll have to get back to you on that.
We're LOS and we'll see you at Guam at 6 plus 20.

SPACECRAFT Okay Brian. Thank you.

CAPCOM Columbia, Houston with you at Guam for 3 minutes.

SPACECRAFT Roger Brian. I'm reading you loud and clear.

CAPCOM Roger, and we read you loud and clear.

END OF TAPE

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CAPCOM Columbia, Houston with you at Guam for 3 minutes.

SPACECRAFT Roger Brian, I'm reading you loud and clear.

CAPCOM Roger, and we read you loud and clear.

SPACECRAFT We're 1 minute and 40 seconds from the next burn.

CAPCOM Roger.

SPACECRAFT And be advised the commander's comm has quit again, totally, and we haven't had time to troubleshoot it right at the moment. So I'm the only one on comm at this time.

CAPCOM Roger.

SPACECRAFT He's either got a 30 CCU failure or the OS panel failure, but we'll have to get tracking on that. You might look up if the circuit breakers check for that OS panel.

CAPCOM Wilco.

SPACECRAFT Don't call us, we'll call you here in a minute.

SPACECRAFT Sure is a spectacular view I'll tell you that.

CAPCOM Roger.

SPACECRAFT Okay Brian, if you're still there. The charlie burn was Delta VX of -01, Delta ZY -.35, Delta ZV 11.10, that's one one point decimal one zero, Delta V total of 1400.

CAPCOM Roger copy that Vance.

CAPCOM Columbia, Houston. Hawaii is next at 6 plus 32.

SPACECRAFT Okay, 6 plus 32, to Hawaii.

CAPCOM Columbia, Houston with you at Hawaii for 7 and 1/2 minutes.

SPACECRAFT Brian, I copy.

CAPCOM And Columbia, Houston. We'd like a word or two with you about the communications with the commander if you've got time.

SPACECRAFT Okay, Brian, I'm listening, I'm trying to get some meal going and I'll be running back up to the burn but go ahead.

CAPCOM Roger, we'd like you to check row A of panel R15, for a main A audio MS/OS for Vance's COMM.

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SPACECRAFT I already did, and that COMMs in, so the next thing we can do is check his unit.

CAPCOM Roger, and we'd also like to know which WCOU he was on when it happened.

SPACECRAFT I'm down below, I'll get that note to you, it's no problem.

CAPCOM Roger.

SPACECRAFT The heartburn we have in this flight is wrestling with this doggone food warmer.

CAPCOM Roger the food warmer.

SPACECRAFT It's really neat, but you got a figure out a way to tie it down permanently someplace.

CAPCOM Roger Bob.

SPACECRAFT Brian, Columbia here. The commander's wearing alpha, that's the one that seems to have failed, if it's that, they said the circuit breaker is in but we haven't had time to check it out yet.

CAPCOM Roger, understand he was using alpha when the problem occurred.

SPACECRAFT (garble)

CAPCOM (garble)

SPACECRAFT On alpha and we just haven't had a chance to switch it.

CAPCOM Roger, copy.

SPACECRAFT And Brian, if you concur looking over our shoulders with us, this is the attitude for the next burn, if you concur that.

CAPCOM Roger Bob, that looks good.

SPACECRAFT Okay.

SPACECRAFT And, just suprise you Brian, I'm still using that DEU and everything is working fine on the, and all the keystrokes have worked great so far, but as soon as we get done here and get a little chow prior to going to bed, I will do that DEU checkout that SSR-16, whatever it was.

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CAPCOM Roger, understand Bob, and I believe that's SSR-14.

SPACECRAFT Okay, whichever, it's in the Mal Proc anyway.

SPACECRAFT Guarantee you, I was one happy guy when I flipped that switch on and it came up big as life.

CAPCOM Roger, I can understand that.

SPACECRAFT Taking away my CRT is like taking away my arm coming downhill.

CAPCOM Roger.

END OF TAPE

SPACECRAFT I guarantee I was one happy guy when I switched that switch on and it came up big as life.

CAPCOM Roger. I can understand that.

SPACECRAFT Taking away my CRT is like taking away my arm coming down hill.

CAPCOM Roger.

SPACECRAFT Also wasn't relishing getting up underneath that console there and changing out that CRT although looks like it would be pretty straight forward.

CAPCOM Roger.

CAPCOM And Columbia, Houston, Bob, if you're still there, sometime when you've got a chance, we'd like to have a recap of Vance's configuration all day today. Which WCCU's and which panels he's been at all day.

SPACECRAFT Okay. I believe he's, oh, wait a minute. Okay Brian, he's been on the OS station and CCU alpha all day.

CAPCOM Roger. Thanks Bob.

SPACECRAFT It quit very suddenly and heard a slight pop when it quit. It was just something that (garble) so we checked the circuit breakers but, anyway, we'll get into that. Let's just get these burns over with. Did we just pass over Hawaii again?

CAPCOM Roger.

SPACECRAFT Okay. I haven't paid any attention. That sure is a pretty sight over those islands.

CAPCOM And sounds like Hawaii has been looking real good on this flight.

SPACECRAFT Yeah, most of, just about all the islands are clear. You can pick them out real well. Strangely enough, they look just like the atlas.

CAPCOM Roger that.

SPACECRAFT You heard that same verse yesterday didn't you?

CAPCOM Roger.

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CAPCOM And Columbia, Houston, we're about to go LOS.
We'll see you at Santiago at 6 plus 59.

SPACECRAFT Okay.

PAO Mission Control, Houston. 15 seconds away from
acquisition at Santiago Chile on orbit 53.

CAPCOM Columbia, Houston with you at Santiago for 4
minutes.

SPACECRAFT Okay Brian.

SPACECRAFT Hey Brian, do you want the numbers from the last
burn.

CAPCOM Roger. Ready to copy.

SPACECRAFT Delta VX -.05, Delta ZY -.12, Delta EZ 11.62,
Delta V total 14.45.

CAPCOM Roger. Copy.

SPACECRAFT The High Andes are pretty today. Nice and clear.

CAPCOM That's great Bob.

SPACECRAFT Giant a lakebed down there, we're going over a dry
lakebed. Looks like we could land about 3 orbiters there.

CAPCOM Roger. I hope we don't need to do that.

SPACECRAFT That's just how bit it was.

CAPCOM And Columbia, Houston, about to go LOS. We'll see
you at Botswana at 7 plus 21.

SPACECRAFT Okay Brian.

CAPCOM Columbia, Houston with you at Botswana for 6
minutes.

SPACECRAFT Okay Houston. I understand the CDR's COMM is okay
now. Be advised that it appears that WCC UA or its antenna is
out. I didn't have time to troubleshoot it. Just changed to
unit echo and it works okay.

CAPCOM Roger. We copy Vance and concur with staying with
alpha, or echo, sorry, echo.

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SPACECRAFT Right.

SPACECRAFT Impressive how fast this burns the gas in the forward tanks.

CAPCOM Roger Vance. We heard that.

SPACECRAFT Brian, if you want the numbers while we're pressing on, Delta VX $-.15, \dots$

END OF TAPE

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SPACECRAFT Brian, if you want the numbers while we're pressing on Delta VX $-.15$, Delta VY $+.25$, Delta VZ 11.38 , that's eleven point three eight, Delta V total 14.25 .

CAPCOM Roger, copy Bob, thanks.

CAPCOM And Columbia, Houston. The burns all look super, the Delta Vs were right on the money, and the prop usage was right as predicted.

CAPCOM Columbia, Houston. About to go LOS for 2 minutes, and then we'll see you at IOS at 7 plus 29.

CAPCOM Columbia, Houston with you at Indian Ocean for 8 minutes.

SPACECRAFT Okay.

SPACECRAFT Houston, Columbia. I've got a question.

CAPCOM Roger, go ahead.

SPACECRAFT Any reason why I can't give you the PAM ASE thermal stuff now?

CAPCOM Stand by.

SPACECRAFT Brian, did I read you the data for burn echo? Or did we lose you at Botswana there?

CAPCOM Roger, we got all the data for burn 5, and all the burns looked real good. The prop usage and the Delta Vs were right on.

SPACECRAFT If you finally get these right if you simulate long enough, huh?

CAPCOM Roger that.

CAPCOM And Columbia, Houston. For tank bravo on the water tonight, we'd like you to dump it to 15 percent.

SPACECRAFT Okay 15 percent on bravo.

SPACECRAFT Any particular time I can start that?

CAPCOM Stand by on that.

SPACECRAFT Okay, I was just wondering if I could get it going now, (garble).

CAPCOM And Columbia, Houston. On the water dump, if you start now, you should go to 10 percent, if you start at the CAP time of 8 hours go to 15 percent.

SPACECRAFT Okay, we'll I'll do it on the CAP, I'm sorry, we probably would want to wait until after the aligns, right?

CAPCOM Roger, stand by.

CAPCOM And Columbia, Houston, recommend we do it as per the CAP.

SPACECRAFT Okay. That's no problem, I was just trying to get ahead.

CAPCOM And Columbia, you're go for your PAM ASE thermal test.

SPACECRAFT Okay, I'll get SPS started now.

CAPCOM And Columbia, Houston, as long as your cleaning up a few items there when you've got a chance this evening, we'd like to repress the right OMS using the B regs.

SPACECRAFT Okay, repress right OMS using B regs.

SPACECRAFT Okay Brian, I've got SBS's thermal data coming down at you.

SPACECRAFT Give it five minutes then put (garble) on.

CAPCOM Roger, we copy.

CAPCOM Columbia, Houston, 30 seconds to LOS. Our next will be Guam at 7 plus 58, and just a reminder if you haven't already done so, we'd like you to put new film and batteries in the 35mm EVA cameras for the EVA tomorrow.

SPACECRAFT Okay, we'll take care of that.

PAO This is Mission Control Houston, loss of signal at Indian Ocean station. A start of orbit number 54. Next station in 19 minutes, will be Guam. The crew was advised by CAPCOM just prior to LOS to put new film and batteries in the - -

END OF TAPE

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PAO CAPCOM just prior to LOS to put new film and batteries in the EVA camera for tomorrow's excursion out into the cargo bay. Day 3, 7 hours 39 minutes Mission Control Houston.

PAO This is Mission Control Houston. Very brief pass here at Guam lasting about 1 minute.

CAPCOM Columbia, Houston. With you at Guam for a minute and a half.

SPACECRAFT Roger, Houston. We're nose to sun and completed the IMU align. Would you like to numbers?

CAPCOM Ready to copy.

SPACECRAFT Okay. Stars 21 and 45 and error 0, angle delta X +.26 +.07 +.01; delta Y, .15 -.03 +.12; delta Z +.04 +.08 -.07, execution time 3 days 7 hours 41 minutes 32 seconds.

CAPCOM Roger copy all, Vance

SPACECRAFT We're dumping water and we'll repress OMS shortly.

CAPCOM And Columbia, Houston. We see you in DAP A1. We'd like to put you in DAP B6 when you get a chance.

SPACECRAFT Okay, will do.

CAPCOM And correction, that's 8:10. And we'd like you to go from A10 to B6.

SPACECRAFT Okay, we'll go to A10 and then to B6.

CAPCOM Roger, understand, Vance. We see you in A10 and we'd like you to go from there to B6.

SPACECRAFT Copy.

CAPCOM And Columbia, Houston. About to go LOS. We'll see you at Hawaii at 8 + 08.

SPACECRAFT Okay, see you there.

PAO This is Mission Control Houston. Loss of Signal at Guam. 8 minutes away from reacquisition at Hawaii. Meanwhile here in the control center building, power bus A2 supplying part of the electrical power into the building has been taken down for inspection. The only affect it has in the flight just now is that we have no command uplink to the spacecraft. We do have UHF and S-band voice. We have downlink telemetry data from the spacecraft. Again the only thing impacted by this inspecton

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of that power bus is uplink commanding to the spacecraft. Crew currently is in the nose to sun attitude as called for the revised flight plan which goes on into the sleep period. 7 minutes to reacquisition through Hawaii on flight orbit number 54. Likely the last pass for Hawaii for the day. Mission Control Houston.

CAPCOM Columbia, Houston. With you at Hawaii for 6 1/2 minutes.

SPACECRAFT Roger, Brian.

CAPCOM Roger. I was going to ask for GNC SPEC 1. Go ahead.

SPACECRAFT SPEC 1. And all I was going to say is we're winding down. Bob just had his exercise and he's eating supper now ...

END OF TAPE

CAPCOMSPEC 1, go ahead.

SPACECRAFT SPEC 1. And all I was going to say is we're winding down, Bob just had his exercise and he's eating supper now and Bill's just finished supper and we're powering down for tomorrow.

CAPCOM Roger Vance, copy.

SPACECRAFT And we haven't done the OMS repress, but we'll get that as soon as Bob gets done eating.

CAPCOM Roger.

SPACECRAFT That was Bravo, right?

CAPCOM That's affirm, right OMS Bravo regs.

SPACECRAFT Okay, he just got it.

CAPCOM And Columbia, Houston, TMBUS and DEU equivalents are up. And we've adjusted the TMBUS, are adjusting for the nose-sun attitude.

SPACECRAFT Roger Brian.

CAPCOM Columbia, Houston. 20 seconds to LOS, we'll see you at Santiago at 8 plus 33.

SPACECRAFT Okay Brian, Santiago.

PAO Mission Control Houston, loss of signal at Hawaii on orbit 54. During the Hawaii pass the command capability from the control center was back up. It was down for the one minute pass at Guam while one of the power buses in the control center was being inspected. We're some 19 minutes away from reacquisition at Santiago. The crew winding down the days activities in preparation for their sleep period. At day 3, 8 hours 14 minutes, Mission Control Houston.

CAPCOM Columbia, Houston with you at Santiago for 6 minutes.

SPACECRAFT Okay Brian, we're here.

SPACECRAFT We don't have anything exciting to report to you, do you have anything exciting for us?

CAPCOM That's negative, right now we're finishing up our tag up, we'd like to have with you at Ascension on the next pass.

SPACECRAFT Okay, well I'm just lying here on the aft flight deck having just finished eating a bite. Lying here upside down looking out the overhead windows at the cloud patterns and the Ocean going by underneath.

CAPCOM Sounds good, weatherman tells me you might have a good view of the South American coast when you come up on it.

SPACECRAFT Okay, good. We haven't yet learned the new attitude in the windows and where to look to see things coming. But it looks like it's out the back end here, although we're going a different direction than I thought we would.

CAPCOM Roger that.

SPACECRAFT Hey by golly the weatherman's right, here it comes.

CAPCOM And Columbia, Houston, if you could give us your elevon position report when you've got a chance.

SPACECRAFT Okay, well looking out the aft it looks like the right outboard, right inboard and left inboard are almost full up, and the left outboard looks like it's pretty much trail.

CAPCOM Roger, copy that.

SPACECRAFT I forget the name of this (garble) zone right up the mountains here, but it is outstanding and easy to see from here.

CAPCOM Roger that Bill.

SPACECRAFT If there is a geologist there ask him if that's the Autocomas Fault.

CAPCOM Roger, we're looking.

SPACECRAFT And as usual, the Eastern half is socked in -
CAPCOM Roger, that's what the satellite picture shows here Bill, too.

SPACECRAFT That's what this satellite picture shows too.

SPACECRAFT They've either got road building people here or animals that walk in awfully straight long lines.

CAPCOM Roger, we hear you.

SPACECRAFT Just comes dead over the top of a reasonably sized town down here, I wonder what it is?

CAPCOM And Columbia, Houston. 30 seconds till LOS.
We'll see you at Ascension and tag up with you at that time.

SPACECRAFT Okay, we'll see you at Ascension.

PAO This is Mission Control Houston. Loss of signal through Santiago. 9 minutes away from reacquisition through Ascension Island tracking station in the South Atlantic. Earlier today in change of shift press conference flight director Tommy Holloway misspoke when he identified the start time of tomorrows EVA at 6:50 EST, he meant CST, central standard time 6:50, that's 10 minutes till 7. Mission Control at day 3 8 hours 40 minutes.

PAO Mission Control Houston. 30 seconds away from acquisition of the Ascension Island. Should be getting voice and data momentarily.

CAPCOM Columbia, Houston. With you at Ascension for 5 minutes.

SPACECRAFT Hello Brian. Stand by Brian while the boss gets his comm line.

CAPCOM Okay.

SPACECRAFT Brian, I want credit for some more miles on my BFT there.

CAPCOM Roger that. And Columbia is you've got a couple of minutes we'll go ahead and tag up with you before we go LOS.

SPACECRAFT Yes, let her rip, Brian.

CAPCOM Roger, you guys did a great job today. The burns went better than any time we practiced them and the experiment coverage was super. Scott Thomas was very excited about the TV you showed him and he's looking forward to the VTR coverage for those other parts we didn't get real time. As far as the orbiter goes, we've had more anomalies in the mocker than you've had up there. Fornutately ours have all been minor ones. We had some rain in Houston a couple of nights ago, this is for Joe. And we were real worried about his car even though all the windows were closed, knowing his car we'd like to offer to send somebody out to open up all the door and let the water out. And for Bob, as a result of the successful DEU work today, Bob MOL buddies are considering revoking his manual texterity award. However, if he can't find his copy there considering making up a new one for him.

SPACECRAFT I'm sure of that but let me tell you. I really question whether that coffee was ever onboard.

CAPCOM Okay, Bob.

SPACECRAFT He's now drinking coffee with sugar.

CAPCOM Roger that. Anomalies with the orbiter, we've talked about WCCUA and the humidity sep analysis is in work. We'll be looking at the waste tank quantities tomorrow morning to see how to single humidity sep worked. We're still researching Bob Stewart's comment on the apple tree's that he made this morning. The orbit team has been unable to figure out what he was talking about and we think it must have been some kind of army joke but we can't find Woody Spring to verify that. It appears that Woody is on his way to Korea to become the special services officer at Klang Jew after the jalapeno episode.

SPACECRAFT That's great.

CAPCOM And concerning tomorrows flight plan of course we've got EVA. You'll be working stowage tomorrow after the EVA and we'll probably have an ASE temp check during the EVA prebrief and we'll have recommendations for Vance's comm hookup for deorbit for you by tomorrow evening.

SPACECRAFT Okay, hey that all sounds real good, Brian.

CAPCOM Okay, Vance and Columbia we'd like you to do step 3 of the reconfiguration to nominal on the RCS VTO when you get a chance.

SPACECRAFT Yeah. We were just about to start that. I'm taking a (garble) backup to get on that SSR, Brian.

CAPCOM Roger that, Bob.

SPACECRAFT I think we had a good day up here to, Brian and looks like we're going to be ready to go tomorrow and ...

END OF TAPE

SPACECRAFT (garble) Brian.

CAPCOM Roger that Bob.

SPACECRAFT and I think we had a good day up here to Brian, and looks like we're going to be ready to go tomorrow and I suppose most of the DTO's are finished except for the EVA. Is that right?

CAPCOM That's affirmative Vance.

SPACECRAFT Right.

CAPCOM And Columbia, Houston with less than a minute to go. The state vector good message will come up a little later tonight on the teleprinter. And again, you had a great day and we'll go ahead and put you all to bed and we're looking forward to a good solid day tomorrow.

SPACECRAFT Same here, and so see you later. Thank you. Take care of those things you mentioned.

CAPCOM Roger that. We're getting right on them.

PAO This is Mission Control, Houston. Loss of signal through Ascension Island in the final pass of the day probably as the crew prepares to go into their scheduled sleep period some 34 minutes from now. Bit of light exchange there between the spacecraft communicator Brian O'connor and the crew and one feedback from the crew was that the way they figured it, they had completed all the detailed test objectives for the flight except for tomorrow's EVA and the people here in the control center agreed with that assessment. Next station is Guam in 35 minutes, but unless there's some reason to call the crew, it's unlikely there will be any air to ground between the control center and Guam, or through Guam. Day 3, 8 hours, 56 minutes. This is Mission Control, Houston.

PAO This is Mission Control, Houston. No contact during the just concluded pass over the Guam tracking station in orbit 55, so apparently the crew is settling in for the sleep period scheduled to last another hour, 7 hours and 50 minutes. Some preliminary numbers for the end of mission landing on Tuesday morning. These numbers were generated as of 3:00 pm today, 400,000 feet. That is entry into the atmosphere. 5 days, 1 hour, 44 minutes, 3 seconds at a range of 4,039 nautical miles. Begin black out at 5 days, 1 hour, 46 minutes, 35 seconds at 3,447 nautical miles range in blackout. 5 days, 2 hours, 1 minute, 22 seconds, 500 nautical miles away from touchdown, and touchdown at 5 days, 2 hours, 13 minutes, 47 seconds, which is approximately 4 hours - 4 minutes later than the premission crew activity plan and sequence of events. Next change-of-shift

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briefing will be at 5:50 pm with offgoing orbit team Flight Director, John Cox. 29 minutes away from acquisition of Columbia through Santiago, but the crew is asleep at this time, at least not talking at day 3, 9 hours, 39 minutes. Mission Control, Houston.

PAO This is Mission Control, Houston again. It appears that I misspoke on the Delta or change in landing time on Tuesday. It's 4 minutes later, not 4 hours. Mission Control, Houston, out.

END OF TAPE

END
DATE
FILMED

JAN 25

1983

"Paul
Worcester"



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

NOVEMBER 1982

STS-5 AIR/GROUND TRANSCRIPTS

PART 3

MET 03:09:39 THROUGH LANDING

PAO I misspoke on the delta or change in landing time on Tuesday it's 4 minutes later not 4 hours, Mission Control Houston out.

PAO This is Shuttle Mission Control, Flight Director Gary Coen and his Planning Team of Flight Controllers have tagged up here in the Mission Control Center and are just now preparing to assume flight control of STS-5 through this evening. Columbia's on it's 56th orbit of the Earth, astronauts about 2 hours into their sleep period now. Off-going Flight Director John Cox will be departing the Mission Control Center shortly and his change of shift briefing should occur on time at 5:50 p.m. Central Time, mission elapsed time 3 days 11 hours 17 minutes, this is Shuttle Mission Control.

PAO This is Shuttle Mission Control, Columbia's on it's 57th orbit of the Earth presently over the Guam tracking station. All's quiet onboard Columbia, the astronauts have just almost 5 hours remaining in their sleep period and although the crew's asleep while the vehicle continues to downlink data through the telemetry network, which of course, is in turn analyzed here at the Control Center and copies from that data that the systems on the vehicle continue to function within normal parameters, mission elapsed time is 3 days 12 hours 44 minutes this is Shuttle Mission Control.

PAO This is Shuttle Mission Control, Columbia's in it's 58th orbit of the Earth everything continues to be quiet onboard the vehicle presently Columbia's over Asia, right about over Bangkok, Thailand in fact. We're in a loss of signal period, one of the longer LOS's of the flight as the vehicle threads its way across, in between a couple of ground stations and it can be another hour before we acquire signal again through Dakar, the ground station at Dakar, mission elapsed time 3 days 14 hours 10 minutes, about 3 and a half hours left in the astronaut's sleep period, this is Shuttle Mission Control.

PAO This is Shuttle Mission Control, Columbia's on it's 59th orbit of the Earth, right now over the northern part of Australia, everything continues to be quiet onboard the vehicle and systems are working within nominal constraints. 1 hour and a half remaining until we wake up the crew. On about one full orbit of the Earth from now in fact, mission elapsed time 3 days 15 hours 59 minutes this is Shuttle Mission Control.

PAO This is Shuttle Mission Control, we're 2 minutes away from acquisition of signal through Yarragadee and can expect to have the wakeup call from CAPCOM to begin today's activities. Columbia's on orbit number 60, mission elapsed time is 3 days 17 hours 24 minutes. We should have acquisition, standing by for that in about a minute and a half. This is Shuttle Mission Control.

END OF TAPE

WAKE UP CALL (music) The Stroll.

SPACECRAFT ...Yarragadee camera.

(music)

CAPCOM Columbia, Houston, with you through Yarragadee for 3 minutes.

SPACECRAFT (garble - very faint).

CAPCOM Columbia, we've got you extremely weak and we'll be with you here for another 2 and 1/2 minutes and then we'll pick you up Orroral for about 2 minutes.

SPACECRAFT (garble - very faint).

CAPCOM And Columbia, Houston, right now you're unreadable on UHF.

SPACECRAFT How do you read us now, Roy?

CAPCOM We got you a lot better now and we're with you for another 2 minutes. We've got some changes to the format in the update that we've sent you. When you've had a chance to look at that we'll talk to you about it.

SPACECRAFT Okay, copy that you've got some updates you've sent to us and then you were blocked by a squeal up here. Say it again please.

CAPCOM Roger, Joe, we made some changes in the format that we've sent you. We've sent you an overview from which you'll be able to execute today's flight plan rather than having to make extensive pen and inks that we gave to you yesterday. And we'll talk to you about that if you have questions.

SPACECRAFT Okay, Dick, I misunderstood the first one and we'll take a look at it and be talking to you shortly again.

CAPCOM Okay. Columbia, Houston, we're 30 seconds from LOS. We'll be with you at Orroral for off and on for about 4 or 5 minutes and that'll be in about 3 minutes.

SPACECRAFT Okay, we'll look for you shortly.

PAO This is Shuttle Mission Control. Shuttle's passing through a keyhole between carrying coverage from Yarragadee and Orroral presently. We'll reacquire again in about a minute and 1/2. Crew's presently in postsleep activity which involves stowing gear.
END OF TAPE

PAO ...carrying coverage from Yaragadee and Orroral presently. We'll reacquire again in about a minute and 1/2. Crew's presently in postsleep activity which involves stowing gear, configuring cabin lighting, communications switches, and removing their window covers. Presumably the faulty UHF voice connection initially was an artifact of the switch configuration onboard the vehicle burst of feedback initially that seemed to indicate that they were still in the speaker boxes which they use to communicate with overnight. The wakeup music from the 50's, "The Stroll". Recognizing the major activity plan for the day, the walk thru the payload bay by Mission Specialists Bill Lenoir and Joe Allen. Standing by for reacquisition here in just about 1/2 a minute at mission elapsed time, 3 days 17 hours 33 minutes. This Shuttle Mission Control.

CAPCOM Columbia, Houston. With your thru Orroral for approximately 4 minutes.

SPACECRAFT Okay, Houston. How are you doing this morning, Dick?

CAPCOM Well, we're doing real fine. The gray team, or planning team will be with you for about 2 1/2 hours this morning and it will be our pleasure to be with you during your waking hours for a while. On your CAP overview and update, when you get around to looking at that guy, you'll notice that we have put all crew activities in single columns. We hope that this format will be something that you can execute directly from and we're able to do it because of the number of activities for the MS's relative to the EVA, they're not specifically calling out for details in the CAP.

SPACECRAFT Okay, well we'll look her over and see how it works. Single columns? John Rivers and Tucker Pierce won't be the same again!

CAPCOM We got that! Columbia, Houston. We're 30 seconds from LOS. We'll be with you next at Mila at 18 10 and we should have at least by the end of the Mila pass a copy of that CAP overview/update up for each one of you.

SPACECRAFT Okay, fine Dick. See you later.

PAO Shuttle Mission Control, we've had a loss of signal thru Orroral Valley. Will reacquire in about 1/2 an hour at Mila and we're orbit 61. Flight Activities Officer has confirmed that all four copies of the revised crew activity plan overview/update have been uplinked to the vehicle, along with weather reports. Crew is still budgeted for presleep activity for another 15 minutes. Then time allocated for reviewing the teleprinter messages that will have been transmitted up this morning, and thru the night. Then breakfast which should carry them thru

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mission elapsed time of 3 days, 19 hours, 46 minutes. At which time we begin the day's events with TV set up, airlock preparations, and some EVA support activities. That again all begins at mission elapsed time of 3 days, 19 hours, 46 minutes. Present mission elapsed time 3 days, 17 hours, 40 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control, we're at 30 seconds away from acquisition of signal thru Mila at 3 days, 18 hours, 10 minutes.

END OF TAPE

PAO Shuttle Mission Control, we're 30 seconds away from acquisition of signal through Mila at 3 days 18 hours 10 minutes.

CAPCOM Columbia, Houston with you through Mila and Bermuda for about the next 10 minutes.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Rog, we got through teleprinter set it up to put our (garble) real fast and we're fixing breakfast now.

CAPCOM Okay, understand that and we're prepared to answer any questions you might have about the CAP activities and the overview and if you don't have any questions about it we have one activity we would like to add on to you.

SPACECRAFT Okay, go ahead. Does that mean if we had a question you wouldn't add anything?

CAPCOM Not til you finish asking the questions and maybe we answered them.

SPACECRAFT You'd add it anyway, ah? We weren't going to have a question but I guess I don't.

CAPCOM Okay, I'll, because we did our EVA prep, or you all did your. anyway, the night before last, we'd like for you to go out now when you get a chance and check the MU lights and just a reminder that to check them you need to leave them on for about 2 or 3 minutes. And if any of those guys are bad I'd like for you to recondition the batteries?

SPACECRAFT Okay Dick, I'll did that again last night, did you want us to do it again this morning?

CAPCOM Negative, you're ahead of us already Bill.

SPACECRAFT Went in there last night and kind of brought the whole EVA prep back up to date again. And Dick, we have changed out the gammans in the batteries and that was quite a grand catch on somebody's part down there, I'd have forgotten to redo that. With regards to the CAP, do you realize that the next step in your single column CAP is a no-column CAP, I want you to think about that.

CAPCOM We could probably find some support for that down here.

SPACECRAFT And Dick are you still with us?

CAPCOM That's affirmative for another 6 minutes.

SPACECRAFT I think you ought to, you'd be happy to know that we never made any comment but that substitution work went extremely well and we're looking forward to the zero to prep to go as well. I think that Flight Planner that whole solution he came up with is very pliable and a very easy thing to do.

CAPCOM Well we're glad to hear that.

SPACECRAFT We figure we only got about 142 to do it for the next flight and that's all, that's a minor number.

CAPCOM We copy.

SPACECRAFT On Thursday I, we could just take and fly it all over again, it was really that easy Dick.

CAPCOM Well you all come back and let some of us get a chance to do that.

SPACECRAFT Okay we'll think about that. When (garble). Did he?

CAPCOM Columbia, Houston, we're 30 seconds to LOS, we'll be with you next at Dakar at 1825.

SPACECRAFT Okay see you at Dakar Dick.

PAO Had a loss of signal through the Bermuda ground station, reacquire again in about 4 minutes through Dakar. Columbia on orbit 61, the crew already about an hour ahead of the summary flight plan for the day's activities. Mission Commander Vance Brand indicating they had completed postsleep activities, that they'd conjure the teleprinter messages updating their crew activity plan saying that they now making breakfast preparations which puts them about 60 minutes ahead of the summary timeline for that activity. Unless there are some expression of media interest to the contrary, our intention is to cancel the 2:50 a.m. change of shift briefing with off-going Flight Director Gary Coen. Again at 2:50 a.m. change of shift briefing will be cancelled unless there is a request to conduct it as planned.

END OF TAPE

PAO ...change of shift briefing with off-going flight director Gary Coen. Again that 2:50 am change of shift briefing will be cancelled unless there is a request to conduct it as planned. Mission elapsed time - 3 days, 18 hours, 22 minutes, reacquisition of signal in 3 minutes thru Dakar, this is Shuttle Mission Control.

CAPCOM Columbia, Houston, with you thru Dakar in Madrid for 7 minutes.

SPACECRAFT Okay, Houston. Read you just fine.

CAPCOM Columbia, Houston. We're 30 seconds to LOS and we'll be with you next at Indian Ocean at 18 44.

SPACECRAFT Roger, Dick. We copy.

PAO Shuttle Mission Control. We've had a loss of signal thru Dakar. Reacquire again in about 11 minutes. Crew's still well ahead of its summary timeline for today's activities. Meal preparations occurring onboard. Data indicates that the crew is performing a fuel cell purge, which is budgeted for about 2 hours from now. The fuel cell is purged by increasing the flow of nitrogen and oxygen thru those membranes to washout impurities and preclude the chance that there will be some inhibition of the flow of power from electrical power from those cells. And again data indicating that that fuel cell purge is presently being performed. Bill Lenoir and Joe Allen indicating that they had gone back to the EVA suits before the sleep period last night, and rechecked some of the power systems, lighting systems, onboard there and again staying well ahead of the required task performances associated with today's EVA. So the crew is well on top of the days activities and we'll continue to monitor their performance. Acquisition of signal again in about 10 minutes. Mission elapsed time is 3 days, 18 hours, 34 minutes. This is Shuttle Mission Control. Shuttle Mission Control, at 3 days, 18 hours, 43 minutes. Voice contact will be established momentarily on orbit 61 through IOS, Indian Ocean Station.

CAPCOM Columbia, Houston's with you thru Indian Ocean for the next 7 1/2 minutes.

SPACECRAFT Roger, Houston. Make a note for me, magazine #44 has got some stereo pairs on it of this part of the world.

CAPCOM Okay, Joe, we copy. Magazine 44, stereo pairs.

SPACECRAFT And with the 50 mm lens how many seconds should go by in exposing the stereo pairs, Dick?

CAPCOM Standby and we'll get that for you.

CAPCOM Joe, Houston. Our best estimate is at 15 seconds between exposures would be right.

SPACECRAFT Okay, good number. I was using 10 so I'm pretty close. Thank you, I'll use 15.

CAPCOM Okay.

SPACECRAFT Okay, Houston, Columbia. You still there?

CAPCOM That's affirmative. We're with you for another 3 minutes.

SPACECRAFT You might take a note, if you're in the note taking mood. On the scrambled eggs, too, we probably ought to increase the rehydration quantity by 1 ounce, and you have to be awful careful to get them totally heated over, very carefully. Because if you don't you heat them up, you end up with just a cloud of scrambled egg.....

END OF TAPE

SPACECRAFT quantity by one ounce. And you have to be awfully careful to get them totally heated over very carefully because if you don't you end up with just a cloud of scrambled eggs all over the cockpit when you open them up and they're too dry and they've broken up into little bitty balls of scrambled eggs. This is the second morning in a row that we've managed to have a cloud of scrambled eggs on the middeck for a few minutes.

CAPCOM Okay, we copy that, Bob, and understand that was an additional one ounce to the rehydration.

SPACECRAFT You have to add one ounce to the rehydration on scrambled eggs and you have to probably to a pretty good job in kneading the package before you put it in the warmer, otherwise the water doesn't penetrate fully down into the egg yet.

CAPCOM We copy.

SPACECRAFT It's hard to see Bob down there till the cloud clears. Actually, they're very tasty and I used the extra ounce in my eggs today and man, these are really great. (garble) the one thing that makes eating a pleasure versus a chore is getting yourself a good position in these restraints so you can get down and enjoy it. Our system right now doesn't really lend itself to that. We've got a lot of make shift work to get the restraints down. I can see an awful lot of improvement needed in the line of restraints and trays to really make eating easy.

CAPCOM Well, we understand how it is for Marines when they eat.

SPACECRAFT We don't always eat out of a foxhole.

CAPCOM And Columbia, we're 30 seconds from LOS and we'll be with you at Yarragadee on the hour.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control. We've had a loss of signal through Indian Ocean station. That was Columbia pilot, Bob Overmyer, offering some observations on the intricacies of eating in zero gravity. The, obviously the scrambled eggs that the astronauts eat for breakfast are powdered and Overmyer was observing that he needed to add an extra ounce of water to the mixture in order to provide enough surface tension on the eggs to eat them comfortably in zero gravity. We reacquire signal again in just under 7 minutes through Yarragadee. Columbia on orbit number 61. Mission elapsed time 3 days 18 hours 15 minutes. Check that. 3 days 18 hours 53 minutes. This is Shuttle Mission Control. Shuttle Mission Control at 3 days 18 hours 60 minutes. 3 days 19 hours. Coming up on voice contact through Yarragadee.

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CAPCOM Columbia, Houston, with you through Yarragadee for 7 and 1/2 minutes. Go ahead. Bob, you can press on with the interconnect if you'd like. Go ahead Columbia.

SPACECRAFT (garble)

CAPCOM Okay, Columbia, that was our intentions and looks like you've got that squared away.

SPACECRAFT (garble)

We're glad to hear that. We felt kind of bad about the number of pen and inks we sent up to you yesterday morning, so we wanted to do better today. And Columbia, we're about 20 seconds from a small LOS between Yarragadee and Orroral. We'll be back with you in about a minute. Columbia, Houston, back with you through Orroral in 5 minutes.

SPACECRAFT Okay. Have the coast of Australia. Sure is pretty.

CAPCOM Well, we're glad to hear that and we're about 30 seconds to LOS and it'll be a long one this time. We'll be...

END OF TAPE

SPACECRAFT The coast of Australia is sure pretty today.

CAPCOM Well we're glad to hear that and we're about 30 seconds to LOS and it'll be a long one this time, we'll be back with you at Mila at 19 45.

SPACECRAFT Okay. It'll be right around that time we intend to get started on the EVA prep.

CAPCOM Okay, we copy Bill.

PAO This is Shuttle Control. In 3 days 19 hours 44 minutes.

CAPCOM With you through Mila and Bermuda for the next 11 minutes.

SPACECRAFT Okay. Let me give you one for your anomaly log down there, its something we've carried all along and forgotten to report. Ready to copy?

CAPCOM Ready to copy.

SPACECRAFT Okay. The back panel event timer and mission timer on alpha 4 have not worked with the (garble) on it, in fact we don't know if it ever worked. We didn't find any circuit breakers out associated with it. Any ideas you might have, we don't want to do a whole lot of trouble shooting quiet frankly we'd just as soon go without it the rest of the mission and let you guys find out on the ground if the trouble shooting is very extensive.

CAPCOM Okay, we copy that and we'll have our people look at it and get back to you.

SPACECRAFT Okay, that's alpha 4 event mission time.

CAPCOM We've got that Rob.

SPACECRAFT Kind of be interested if he kinda would come up with a estimated time of completion of that dump that we've got going based on what he sees now.

CAPCOM Okay we'll get right back to you. Columbia, Houston, the time on your dump should be complete, it should be complete in 20 minutes.

SPACECRAFT Okay, I'll set a clock. Thank you. May as well since your bothered EECOM how does the fuel cell purge look and how are the fuel cells looking these days?

CAPCOM Columbia the, it looks like the purge is complete

and fuel cells are all looking real good.

SPACECRAFT Okay. Got a pretty bright city right off our left wing here. I'm looking down at the Miami area by any chance?

CAPCOM Columbia it looks like it's a good possibility that Miami.

SPACECRAFT Okay it must be. It's bright, looks like they have a nice weather and everything, probably better.

CAPCOM We copy.

SPACECRAFT (garble) the lights are reflecting off of low clouds some but it really looks bright and pretty. Hey Dick, we've got a problem. Not only that Dick, they need to know where the Bio-Med adapter cable is, they can't find it.

CAPCOM Roger we copy and we'll find it for you. Columbia, Houston, we're about 20 seconds to LOS and we'll be back with you at Dakar on the hour and we'll find that cable by then.

SPACECRAFT Okay, we sure hate to, sorry we had to wait, all of a sudden they can't find the darn thing. We're going through a big search right now.

CAPCOM Roger.

PAO This is Shuttle Control. Bermuda has loss of signal, next acquisition through Dakar in 3 and a half minutes. At 3 days 19 hours 56 minutes mission elapsed time, this is Shuttle Control Houston.

CAPCOM Columbia, Houston, with you through Dakar for 6 minutes.

SPACECRAFT Okay we copy.

CAPCOM And have you found that cable?

END OF TAPE

PAO mission elapsed time. This is Shuttle Control Houston.

CAPCOM Columbia, Houston, now with you through Dakar for 6 minutes.

SPACECRAFT Okay, we copy.

CAPCOM And have you found that cable yet? Columbia, Houston, we have location of the biomed extension cable if you're ready to copy.

SPACECRAFT Go ahead.

CAPCOM Okay, we've actually found it in two places. Looks like the easiest one will be in the electrode kit and that's in mike fox 28 oscar.

SPACECRAFT Mike fox 28 oscar in the electrode kit?

CAPCOM That's affirmative.

SPACECRAFT Okay, Dick, what we're talking about is the adaptor cable where it connects right to the ships bio-med so they don't have to connect it to the suit. And we can't find that cable. It's not in 28 mike fox 28 oscar. And the last exercise that was in Joe's biomed well it's not there today.

CAPCOM Okay, we copy, and we've got that backup location. We're trying to sort out the one to send you there.

SPACECRAFT Okay, do you understand it's the cable that goes directly to the ship so we don't have to tie it to the suit for this biomed check.

CAPCOM Roger, we understand that Bob. Okay, Bob, there should be one of those guys in the red trimmed medical kit. And that's located in mike fox trot 1 4 oscar.

SPACECRAFT Fourteen oscar in medical kit, the red trimmed one. Okay, we'll look there. Okay, Dick, we got it.

CAPCOM Okay, real fine.

SPACECRAFT And alert the surgeon there to be looking for some data pretty quick here.

CAPCOM We copy Columbia and he's looking.

SPACECRAFT How much time do we have here at Dakar, Dick.

CAPCOM Now we've got just under 3 minutes, Bob.

SPACECRAFT Okay, well Bill's plugging it in right now so. We've got some pumps, stand by. Dick, keep looking. Bill's plugging it in right now. Might make a mark that a bunch of exposures on mag 45 were over this desert area we might know as Africa.

CAPCOM Okay, we copy exposures on mag 45 and that Bill's plugged in.

SPACECRAFT Right, and that's 40 at about 47 on the mag.

CAPCOM We copy.

SPACECRAFT Well, when you get in Bill's data, because that will give you Joe.

CAPCOM We've got your data and it's satisfactory.

SPACECRAFT And Bill, okay, we'll switch over to Joe.

CAPCOM Roger, we copy, and we've got about 15 seconds to LOS here at Dakar. We'll be with you again at Indian Ocean at 20 19.

PAO This is Shuttle Control. Columbia's out of range of Dakar. Next station is the Indian Ocean station in 11 minutes. Surgeon reports getting good medical data on Lenoir and believes he saw a short bit on Joe Allen just before LOS. At 3 days 20 hours 8 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 3 days 20 hours 18 minutes mission elapsed time. The Indian Ocean station is about to lock on to Columbia.

SPACECRAFT (garble) And

CAPCOM Columbia, Houston, with you through Indian Ocean for 7 and 1/2 minutes.

SPACECRAFT Okay, Houston, we're with you.

END OF TAPE

CAPCOM Columbia, Houston with you thru Indian Ocean for 7 1/2 minutes.

SPACECRAFT Okay Houston. We're with you. Joe's plugged in ready to go.

CAPCOM Roger, we copy. And Columbia, we have good data on Joe.

SPACECRAFT Okay, good. Thank you.

CAPCOM And Columbia, Houston. We have an update on Joe that y'all can terminate that whenever you please.

SPACECRAFT Okay, no sooner said than done, I think we beat you to it a little bit.

CAPCOM We copy. Columbia, Houston. We're one minute to LOS at Indian Ocean and the gray team will be handing over to the ascent and entry guys who are going to take you all thru the EVA. We want to wish you a, the best of luck and want you to for sure enjoy your EVA and we're going to pack it in and try to get back out of here in time to see some of it.

SPACECRAFT Okay, Dick. Thanks for everything this morning and those two guys are really looking forward to the EVA and we're looking forward to a good day. So thanks alot.

CAPCOM Okay, and the ivory team will be with you at Yarragadee at 20:35.

SPACECRAFT Okay, we'll see them there.

PAO This is Shuttle Control. Indian Ocean station has loss of station. Next acquisition thru Yarragadee in 7 1/2 minutes. Here in the Mission Control Center a hand-over is underway. From the flight control team led by Gary Coen to flight director Tom Holloway's team. CAPCOM's on the oncoming shift are Bob Stuart, and Roy Bridges. At 3 days, 20 hour 28 minutes mission elapsed time. This is Shuttle Mission Control Houston. This is Shuttle Mission Control at 3 days, 20 hours, 34 minutes mission elapsed time. Standing by for acquisition with Columbia thru Yarragadee.

CAPCOM Columbia, this is Houston with you at Yarragadee for 8 minutes. Columbia, this is Houston with you thru Yarragadee for 6 minutes.

PAO This is Shuttle Control, Yarragadee has loss of signal, but we'll pick up Orroral in about 45 seconds. We'll standby.

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CAPCOM Columbia this is Houston with you thru Orroral for 2 1/2 minutes.

SPACECRAFT Okay, Houston. Columbia, and we're, we've got Bill in his suit and Joe partialy in his suit.

CAPCOM Hey, mighty fine, Van.

SPACECRAFT (garble)

CAPCOM Columbia, this is Houston.

SPACECRAFT Houston, go ahead.

CAPCOM Okay Columbia, we just thought you were trying to contact us and we're 20 seconds to LOS at Orroral and Buckhorn will be next at 2 1:1 4.

SPACECRAFT Okay, very good. See you there. Things are going well, and we're on timeline I believe.

CAPCOM Roger.

SPACECRAFT (garble)

PAO This is Shuttle Control...

END OF TAPE

SPACECRAFT ..a bad.

PAO This is Shuttle Control. Columbia is out of range at Orroral now. Starting his trip up over the Pacific Ocean toward acquisition through Buckhorn, California station in 26 and a half minutes, during this pass Vance Brand reported that Bill Lenoir is fully suited, Joe Allen partially suited. Brand reporting all going well and on the timeline. At 3 days 20 hours 48 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control 3 days 21 hours 13 minutes mission elapsed time, we have acquisition through Buckhorn.

SPACECRAFT (garble) do it, pull it up and let go. Did he get it? You've got to it entangled right now, oops that missed it. What you need is to come in more like this, I can't quite reach it, almost if you bend up, I've got you. I don't know, did you see him? It's tripping out for some reason, it does have some kind of a control circuitry in there, that makes it tough to work around. It was doing it on his battery too, I don't know if that's going to matter, I think it's his fan.

CAPCOM Columbia, Houston, with you at Buckhorn for about 2 minutes.

SPACECRAFT Say Houston, we've got something to report to you on this EVA prep, standby. Houston, how do you read EV 1?

CAPCOM With you 5-by EV 1.

SPACECRAFT Okay, we've got a problem with Joe's fan, we got to the point where we both got helmets on, I got my fan on and up and running, Joe's fan was on and running and SCU and then it suddenly quite and at the same time he got a bite light on his D&C panel. We cycled the fan and came back on but dropped back off lining and we've looked at SCU and batt power and basically it's the same way, it'll come on for a few seconds, trip off, give him a bite light on the D&C panel and on the SCU power he charging the same voltage I am, about 19.4 and I drawing about 4.1 or 2 amps of steady state, when his fan comes on the amps go up scale high for about 2 seconds and then they drop down 1 amp. And that's where we are, we've got Joe's helmet off and I just took mine off as well, and we're looking for some ideas?

CAPCOM Roger, we're think about it and get back to you.

SPACECRAFT And Roy, can you read EV-2 now?

CAPCOM Roger, your 5-by Joe.

SPACECRAFT Can you read EV 2?

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CAPCOM Roger EV 2, you're 5-by, how me?

SPACECRAFT Okay, we could hear the fan increase and decrease in speed as though it was lagging before it shuts off. It's as though it's drawing a heavy load of some kind, and Bill says it does it both on the SCU and on batt power.

CAPCOM Okay, we copy.

END OF TAPE

SPACECRAFT ...before it shuts off. Its as though its drawing a heavy load of some kind. And as Bill says, it does it both on the SCU and on BATT power.

CAPCOM Okay, we copy thay Joe. We're going to LOS in 15 seconds. We'll pick you up again at Mila at 21 19.

SPACECRAFT Okay, Roy. We'll see you there.

CAPCOM Pleasure.

SPACECRAFT I'm going to hardline.

PAO This is Shuttle Control. LOS of signal thru Buckhorn. Merritt Island will pick up Columbia in a minute 1/2 a problem with Joe Allen's suit fan. Fan will start but then shuts off after a short time. That problem being studied here in the control center. Both EVA crewman Allen and Lenoir have removed their helmets. Bill Lenoir reported so they are not now pre-breathing. That pre-breathing had been scheduled to start at 3 days, 21 hours 10 minutes, about 8 minutes ago, 8 or 9 minutes ago, but their main problem now is to solve the fan situtation. We should have acquisition thru Mila in about 30 seconds. We'll stand by.

CAPCOM Columbia, Houston with you thru Mila in Berauda for 12 minutes.

SPACECRAFT Okay, Roy we got you. Roy, we're hearing you, how do you read?

CAPCOM Just fine now. And Vance, we're still looking at the problem here. In the meantime, we recommend you go back to bravo DAP, bravo 6.

SPACECRAFT I understand, bravo 6. Okay. And Roy, while we're waiting for some word from you, just be advised that the suit up to that point went extremely smooth and very well. And now all the systems locked in without any problem and we're essentially pressing right along until that fan problem. I can verify that this fan absolutely stopped running. I put my head as close to the back of his pack as I could, and I could not hear a fan and on Willies I could hear Lenoirs fan all the time, no problem. So it was pretty obvious that when those amps dropped off on Joe's that his fan had just quit. And Roy, a final word, our feeling is it'll start running for a few minutes if we turn on again. You might consider foregoing a leak check till we get to a low pressure. I'm sure that if there's not quite such an atmosphere to drag around, the fan may well work.

CAPCOM Okay Joe. We copied that and we'll consider it.

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SPACECRAFT And we just read on the Comm that pass the leak check after the pre-breathe. Bill and I are hot to the ground. That's affirm, I just reminded Joe. We're hearing everybody and hot to everywhere. Yep. They must be, I'm hearing you.

END OF TAPE

CAPCOM Columbia, Houston.

SPACECRAFT Go ahead.

CAPCOM Roger, Columbia, Bob, recommendation we have for you is to remove the LiOH cartridge from Joe's MU and check for water. If you find any to clean it up.

SPACECRAFT Okay, in work. Say it again, Roy. Remove the LiOH cartridge and what?

CAPCOM Look for water.

SPACECRAFT Okay.

CAPCOM That's affirmative.

SPACECRAFT Clear Bob. You want me to come off the wall and get out of here? Yes, get me off the wall and lying down and then Bob can work. Now is that the position? (garble) That's it. Yes. (garble) down. There you go. Okay, now I can just hold on right here Robert if what's convenient for you to work.

CAPCOM Columbia, Houston.

SPACECRAFT Go ahead.

CAPCOM Bob, replace the LiOH cannister also.

SPACECRAFT Okay. Bob will do that. I just I can hang on right here if you can (garble). Okay, Roy, can you tell me where the (garble) replace. What cabinet, do I just have to go to look for to replace the LiOH please.

CAPCOM Yes, standby a moment Bob and I'll tell you where that new LiOH cartridge is located.

SPACECRAFT I'm ready to go out and get it or take the old one out. (garble). I'm fine, no sweat.

CAPCOM Columbia, Houston, also Bob when you have that cannister removed we want to check and see if the fan will run with the cannister out before you put a new cannister back in.

SPACECRAFT Okay, we copy, Roy, we'll give it a try. The cannister is out now. Joe, why don't you turn around and look at that. I'll turn the fan on now. Are you set? Yes. Fan's coming from off and I'm (garble). Okay. Well, what do you think (garble) in there. I thought it just clipped off again, didn't it? Did you run it? Yes. How many amps, Bob, how many amps? EV2. Okay, Roy, Joe with the LiOH cannister out has started his fan. It seems to run although it apparently wants to

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motor boat. He's drawing 4 amps but intermittently low.

CAPCOM Okay, copy 4 amps but intermittently low and the fan is tending the motor boat.

SPACECRAFT (garble) She's throwing 4 amps but it's slightly down from 4 to 3.8. You can hear a little bit of tugging on the fan but not much. It's almost steady state.

CAPCOM Okay, good.

SPACECRAFT Give me that the cell LiOH (garble) please.

CAPCOM Okay, we're still looking, Bob, standby a second. Okay, Bob, that new LiOH cannister's in MA9 Lima.

SPACECRAFT Okay, hey Roy, Joe reports he can hear it motor boat that

END OF TAPE

CAPCOM Okay, Bob. That's new LiOH cannisters and MA9 Lima.

SPACECRAFT Okay, Hey Roy, Joe reports he can hear it motorboat that sounds like water. Roy, standby, say that number again.

CAPCOM MA9 Lima.

SPACECRAFT Hey Bob, you've got (garble). Roy, this is Joe, (garble) Hey Roy, this is EV1, Joe, his fan is still running. Do you want us to leave it run or turn it off?

CAPCOM Standby. Columbia, Houston. Recommend you turn it off for the time being.

SPACECRAFT Okay. Okay, Roy. We turned it off now. Okay, his fan is off.

CAPCOM Roger, we can hear it.

SPACECRAFT We've got a lot of static as I'm sure you can hear.

CAPCOM That's affirmative. We can hear it when the fan is on.

SPACECRAFT Roy, where could the water be? Anywhere in that loop. I would think we could blow it out, Bill. If its in there. Its got a water separator, as a matter of fact. Okay, Roy. I've got the spare LiOH ready to go on anytime. I do not see any visual water anywhere in the back at all, and I've looked as far up into those holes as I can. Any place else I can look?

CAPCOM Standby a moment, Bob.

SPACECRAFT No, it couldn't have gotten in here. No way. But the hatch has been closed.

CAPCOM Okay, Columbia, Houston. One other place we recommend you look is to disconnect the ICGV and look in that area.

SPACECRAFT (garble). At the disconnect? At the disconnect, the back? I think he means the waist disconnect. At the waist disconnect, Roy? I don't think there's water there. I don't feel any water. If its leaking there. Do you want us to drop the lower torso on Joe and disconnect that ICG? Roy, did you copy Bob?

CAPCOM Yes, we copy and we don't have a good recommendation before we go LOS here. We have about 5 seconds,

we'll pick you up in Dakar in 21 35. Y'all just look for water where ever you think theres a good chance you might find some.

SPACECRAFT Thank you. What did he say? Okay, and Roy, we don't have any free water in the cabin now.

CAPCOM I understand.

PAO This is Shuttle Control. Bermuda has loss of signal. Dakar is next in 2 1/2 minutes. Still troubleshooting Joe Allens suit. The EVA controller here in the control Mission Control Center, believes the problem is either water in the fan or an electrical short. Still checking for water. Columbia's crew reports there is no free water in the cabin, and they found no water when they removed lithium-hydroxide cannister from the extra-vehicular mobility unit. They are considering now checking the liquid cooled garment in various places to see if whether they might ...

END OF TAPE

PAO Lithium hydroxide cannister from the extravehicular mobility unit, they are considering now a checking the liquid cooled garment in various places to see whether they might find water. We'll standby for communications through Dakar about a minute and 20 seconds. At 3 days 21 hours 33 minutes mission elapsed time this is Shuttle Control Houston.

SPACECRAFT It's kind of a weird reception. I guess AC but I wouldn't swear to it (interference)

CAPCOM Columbia, Houston, with you at Dakar for 8 minutes.

SPACECRAFT Okay Roy, we didn't have any ideas either, but in the interim we had Bob get out the vacuum cleaner. (Interference). Would it be any better for us to be sucking the air blowing in or pushing it in or out of the LiOH connection?

CAPCOM Okay, that sounds like a good idea, try to blow it out if you can.

SPACECRAFT You want to blow it out, ah? Okay, we'll give it a try. And Houston, do you hear the interference we've got on this frequency right now?

CAPCOM Roger, we hear it and we'll try to get rid of it.

SPACECRAFT Alright (interference) Okay my water's off, I'm going to turn my fan on and I'm on SCU (interference). Make it easier (interference) Houston, this is Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Rog, we might turn Bob, we're getting a real bad interference, we may turn UHF off for a short time we can still communicate S-band right?

CAPCOM Affirmative.

SPACECRAFT Okay, hey Roy, (interference). This is EV-1. Get a hold on. Roy this is Bob, how do you read?

CAPCOM Okay I read you 5-by now Bob, and we've got three requests for you.

SPACECRAFT I'd like to make a comment first, if you want to listen.

CAPCOM Go ahead.

SPACECRAFT When we turn on his fan now we tried second on the side that he, would be, blowing out on the fan here, when you

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press the fan on, there's definitely a suction on the one on the port as I look at it on the right side, starboard side,

END OF TAPE

SPACECRAFT You don't understand now. We tried second on the side that you were going out on the fan there. When he turns the fan there's definitely a suction on the one on the port. As I look at it on the right side, the starboard side. But as you, but there's no air or barely coming out of the other side like there's a blockage in there of some sort. It doesn't appear to be any air coming out of the left port.

CAPCOM Okay, we copy that.

SPACECRAFT Go ahead with your address.

CAPCOM Okay, we wanted to know Joe's current configuration.

SPACECRAFT Well, he's off the wall and holding onto the handrail. The helmets are off both guys. And I've got the old LiOH cannister off right now and I got the new LiOH cannister sitting on the floor ready to put in. Now when we ran the fan that time it the amps came down to 4 but they cycled a little lower that time than the first time. They cycled for 4 down to about 3.2 and then back up to 3.4, 3.8 and they seem to be a bigger swing than the time before.

CAPCOM Okay, we copy, we'd like to know if the bite light is on continuously.

SPACECRAFT Houston, do you read EV1?

CAPCOM Roger. Read you 5 by, EV1.

SPACECRAFT Okay. The bite light I believe is only on when the fan is on. Yes, Joe's indicating that's correct. We've had to go to a hardline and turn UHF off here. That the bite light is on only when the fan is on and running or not running as the case may be.

CAPCOM Okay, but when the fan is on and running then it's on continuously? The bite is on continuously.

SPACECRAFT That's affirm. That is affirm.

CAPCOM Okay, the other recommendation we have is to try to switch SCU and see if Joe's fan will run on the other SCU.

SPACECRAFT Okay, we had thought of that and we didn't quite get to it before you came up there with it the first time. We can do that right now.

CAPCOM Roger. Columbia, Houston.

SPACECRAFT Go ahead.

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CAPCOM Roger, Bob, in answer to your concern about no air coming out of the left side. That is the inlet. There should be no air coming out of that side.

SPACECRAFT I think there's a definite suction in the one side and there's obviously no air coming out of the other.

CAPCOM Okay, Bob, we may have it backwards. Columbia, Houston, we're 30 seconds LOS. We'll see you at Indian Ocean at 21 57.

SPACECRAFT Okay, Roy, we swapped SCU's that Joe's fan still behaves the same or on the other SCU.

CAPCOM Okay, we copy.

SPACECRAFT (garble) continuous bite light and we can hear it motor boating.

CAPCOM Roger, and we'll be back with you at IOS.

SPACECRAFT Okay, I'm

PAO This is Shuttle Control. Dakar has loss of signal. Columbia's next acquisition will be through the Indian Ocean station in 12 and 1/2 minutes. Crew still attempting to solve the problem of Joe Allen's suit. The fan is not operating properly. They switched the service and cooling umbilicals. That did not help the situation. This problem will continue to be worked on the ground and aboard Columbia. At 3 days 21 hours 45 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 3 days 21 hours 56 minutes mission elapsed time. Columbia about 15 seconds away from acquisition through the Indian Ocean station. Here in the control center the EMU experts are continuing to troubleshoot this problem with Joe Allen's suit fan. The fan actually in the EMU, the extra vehicular mobility unit. We'll standby.

CAPCOM Columbia, Houston, with you through Indian Ocean for 2 and 1/2 minutes.

END OF TAPE

PAO we'll standby.

CAPCOM Columbia, Houston, with you through Indian Ocean for 2 and a half minutes.

SPACECRAFT (garble)

CAPCOM Okay, we don't have a solution for you yet, we'll still working on the problem and would like to continue working the problem for the next hour or so. One thing we would like for you to do though is to set up for UHF COM at Yarragadee.

SPACECRAFT Okay, we'll get that, Roger, we have real bad interference on the Atlantic and Africa.

CAPCOM Roger, and we could hear a lot of that Vance.

SPACECRAFT Okay. Hey Roy, to you up to date of what we tried on the interium is we looked at this schematics and verified that the one port that exhibit suction should, but the other portion should not exhibit any pressure because it's really connected through the open helmet and everything to the arm and leg vent, so the fact that no air was coming out there is not significant.

CAPCOM Roger.

SPACECRAFT Alright, we have run Joe's cooling to full cold to verify that the fan so different there, the last time we cycled the fan it seemed to be degraded somewhat, but runs like it's labored and wants to motor boat and just behaves like it's blocked, get that?

CAPCOM Roger, we copy.

SPACECRAFT And one thing is that it does pop water. We were wondering if a waterloop blockage would be sufficient to cause the fan motor itself to have the problems its having.

CAPCOM Okay, we'll evaluate that. And Columbia, Houston, we're 30 seconds LOS.

SPACECRAFT Okay Houston, and we'll be simplex 2 59 7.

CAPCOM That's firmative Vance and we'll see you at 22 10.

PAO This is Shuttle Control. Columbia out of range at the Indian Ocean station. Yarragadee is next in 10 minutes, no solution yet to the fan problem in Joe Allen's suit, we'll

continue to trouble shoot that. At 3 days 22 hours mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at 3 days 22 hours 10 minutes mission elapsed time, standing by for acquisition through Yarragadee.

CAPCOM Columbia, Houston, with you through Yarragadee for 8 minutes.

SPACECRAFT Roger Houston. Do you read EV 1?

CAPCOM Roger, you're 5-by.

SPACECRAFT Okay, we're in the airlock, Joe was getting hot so we're in the process right now of getting him out of this suit the pants, the lower torso's off and he's struggling to get out of the helmet.

CAPCOM Okay we copy and Bill in answer to the comment you made at the last station, the fan would still work even if the Waterloo were frozen up.

SPACECRAFT That's what I thought, that magnetic coupling just isn't strong enough to stall the fan motor. And we have found no water anywhere.

CAPCOM Okay we understand, and we are still investigating, trying to find some way to get possible trapped water out of the fan, and we'll be back to you as soon as we finish those investigations.

SPACECRAFT Okay and the last time we tried to cycle again it does the same thing and it motor boats, would say like about a five hertz motor boating.

CAPCOM Okay copy.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Roy, just one thought here, just looking way ahead here, in the event that we don't get this problem fixed, to give you an hour anticipation, you might request that you might...

END OF TAPE

CAPCOM Go ahead Columbia.

SPACECRAFT Roy, just one thought here. Just looking way ahead here in the event that we don't get this problem fixed, to give you an hours anticipation, you might request you might anticipate a suggestion for a short solo.

CAPCOM Roger, your request is noted.

SPACECRAFT Understand. It was just a suggestion Roy, not a request, a suggestion in the interest of the program.

CAPCOM Roger, your suggestion is noted.

SPACECRAFT So lets get this one solved and go do it right.

CAPCOM Okay, we're full speed ahead on that.

SPACECRAFT Roy, you might be interested. We just ran the fan with Joe out of the suit and we had the same problem.

CAPCOM Roger and standby a minute. Columbia, Houston.

SPACECRAFT Go ahead.

CAPCOM Roger. Here's the suggestion we have for you, while you're LOS over the Pacific. We would like for you to put the helmet on the torso; put it to the no-vent position; put the IV to 02 and run the fan until Hawaii; unless its .. standby.

SPACECRAFT You cut out at the end. Unless the fan is what?

CAPCOM Standby. Okay, Columbia, Houston. We've got a slight change in that plan. Helmet on the torso in the no-vent position. Leave the 02 actuator off, run it until, to Hawaii if it is fairly stable.

SPACECRAFT Okay, by fairly stable, you mean continuing a motor boating.

CAPCOM Yes, we mean if it continues what its doing now.

SPACECRAFT Okay, and if it degrades at all, the intent would be to turn it off unless you want us to leave it running.

CAPCOM Your judgement. We'll see you at Hawaii at 22 37.

SPACECRAFT Okay.

PAO This is Shuttle Control, Yarragadee has a loss of signal. Columbia's next station is Hawaii in 18 minutes. Continuing to troubleshoot the problem with Joe Allens suit

fan. Reported that he was getting hot so he has taken the suit off. Crew has found no water, which is one of the suspected problems. Experts on the ground have now asked them to put the helmet back onto the neck ring onto the torso of the suit. Place it in the no-vent position and turn the fan on, if the fan will run. They'll continue to let it run until we have acquisition at Hawaii. In the mean time, the investigation of the problem will continue. At 3 days, 22 hours, 20 minutes mission elapsed time, this is Shuttle Mission Control, Houston. This is Shuttle Control we have acquisition thru Hawaii, we'll standby.

CAPCOM Columbia, this is Houston with you thru Hawaii for 5 minutes.

SPACECRAFT Okay, Houston, this is Columbia. We got the report on what's happened with Joe's suit here.

CAPCOM Go ahead, Bill.

SPACECRAFT Okay, we ran the fan as you said, with the helmet on, the no-vent flow powered from the SCU, and it ran for about 4 to 5 minutes. It gradually deteriorated and then flat quit.....

END OF TAPE

SPACECRAFT what's happening with Joe's suit here.

CAPCOM Go ahead Bill.

SPACECRAFT Okay, we went in the SIM as you said with the helmet on the no vent flow powered from the SCU and it ran for about 4 to 5 minutes. It gradually deteriorated and then flat quit and we turned it off and here we are. And it'll start but then it'll more or less immediately die.

CAPCOM Okay, Bill, let us think about that for a minute.

SPACECRAFT Okay, we just started it again. It died down into a motor boating status and it is right now motor boating. It's very slowly deteriorating. I can hear it clicking. You can probably hear it clicking in the comm and it's in the process of dying.

CAPCOM Yes, that's affirm. That sounds like that motor boat is just about died.

SPACECRAFT And while it's motor boating (garble). And while it's motor boating it doesn't sound like a stalled fan because it's drawing less current not more current and the last bit where we were motor boating at about 1 hertz it was swinging from about 1 and 1/2 to 2 amps.

CAPCOM Okay, Bill, we copy.

SPACECRAFT Make that 1 to 2 amps and 1 is the basic draw of the D&C panel here without a fan on.

CAPCOM Okay, your question is what's the current draw for the D&C panel without the fan?

SPACECRAFT No, we were telling you it's about 1 amp.

CAPCOM Okay, Yes, that's good.

SPACECRAFT Bob, this is Joe, do you hear me?

CAPCOM Yes, Joe, you're loud and clear.

SPACECRAFT Okay, I would sure like to make a strong suggestion that if it comes down to it as Bill proceeds with this. He's well trained and oughta go do it. That's another extra suggestion from guy with a bad fan motor at the moment.

CAPCOM Okay, Joe, we copy your suggestion.

SPACECRAFT Hey, Roy, following up on that. Doing some

thinking about that very thought in looking at our flight plan here for the EVA I would if we did that proposed that we just do a bare bones to verify the EVA which in essence would be the aft translation and some of the little dogs and cats. I would not be very inclined to want to put my foot into any foot restraints being the only guy out there.

CAPCOM Yes, Bill, we copy and we'll probably not get back to you with this pass with a plan but we'll certainly talk to you over the states.

SPACECRAFT Okay, I'll just hang in here on the wall like a bat. And Roy, Vance here. Along with everybody else down there I'm still thinking about this proposal too.

CAPCOM Yes, Vance, we know. And Roy, while I got you on the line here let me pass a couple of messages to you about the Orbiter.

SPACECRAFT Go ahead.

CAPCOM Okay, on page 4-74 the CAP. We're already in the hydraulic thermal conditioning enable. We would like to get make sure that the red control valve, temperature, high. We'll get a TMBU, okay, that's okay Vance. Okay, let's go to page 4-76 of the CAP.

SPACECRAFT Okay, I'm turned to 4-76.

CAPCOM Okay, you've got a delete hydraulic thermal condition there on 4-76 for that interaction test. We want to delete that termination and we want to stay in the thermostat mode for the nose sun attitude.

SPACECRAFT Okay, well, let's get this straight. I started the I started the thing and standby. Okay, repeat what you said again.

CAPCOM Okay, on at about 20 45 on page 4-76 you've got a hydraulic thermal control system interaction test. Part of that procedure says to terminate hydraulic thermal conditioning. We did not want to terminate hydraulic thermal conditioning now.

SPACECRAFT Okay, copy.

CAPCOM We need to stay in the thermostat mode for the nose sun attitude.

SPACECRAFT Okay, understand. And I have out temp high that's been on high since they started the tests about 5, 6 minutes ago.

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CAPCOM Yes, Vance, EECOM told me after I started talking to you there and the TMBU's are onboard.

SPACECRAFT Okay, and I'm standing by for the DFI thing if you'd like to start that any time. Yes, DFI power up.

CAPCOM Okay, Vance, you can go anytime on that.

SPACECRAFT Okay.

CAPCOM And we're approaching LOS. 10 seconds to LOS. We'll talk to you next.

END OF TAPE

CAPCOM ...if you'd like to start that anytime.

SPACECRAFT DFI power-up.

CAPCOM Okay Vance you can go anytime on that.

SPACECRAFT Okay.

CAPCOM And we're approaching LOS, 10 seconds to LOS, we'll come to you next over Buckhorn.

PAO This is Shuttle Control. Columbia has loss of signal through Hawaii and will be within range of the Buckhorn, California station in 3 and a half minutes. Still no joy on Joe Allen's suit fan. Bill Lenoir reporting here at Hawaii that the fan ran for about 4 or 5 minutes during that test that started at Yarragadee, but then deteriorated and then quit all together. Planning's still underway here at Mission Control Center about what further actions will be taken. We intend to talk to the crew about that over the United States in about 3 minutes. At 3 days 22 hours 44 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at 3 days 22 hours 46 minutes mission elapsed time. Columbia about 20 seconds away from acquisition through Buckhorn, we'll standby.

CAPCOM Columbia, this is Houston with you through Buckhorn for 7 minutes.

SPACECRAFT Roger.

CAPCOM Columbia, Houston..

SPACECRAFT Go ahead.

CAPCOM Okay we're developing a plan down here we'd like, we would like to get Bill into a prebreathe mode as soon as possible. And we're looking at a plan for an EMU checkout BY letting Bill stay in the airlock, depress the airlock and open the outer hatch with no airlock egress and we're throwing that up for your comments.

SPACECRAFT Dont't knock it.

CAPCOM Columbia, Houston, say again please.

SPACECRAFT Okay Houston, we'll get him into the prebreathe mode to do the exact things you said.

CAPCOM Columbia, Houston we've got the tie data we're ready for the strain gauge signal conditioners to go off.

CAPCOM Okay, we'll turn them on.

SPACECRAFT Okay Bob I'm in the suit and my delta-P right now is 1 and I'm climbing in pressure.

CAPCOM Okay Bill, we copy. And Columbia, in about 30 seconds we're going to have a one minute break in COM and Mila's going to come up in about 55.

SPACECRAFT Okay Bob. See you at Mila.

CAPCOM Columbia, Houston is back with you through Mila.

SPACECRAFT Roger. Okay Bob how do you read EV 1?

CAPCOM Got you loud and clear Bob.

SPACECRAFT Bob, in that motor circuit on that fan, is there a cut out on the fan somehow on the auto circuit, that is the thing (garble) because the fan never fails to start and get up to speed. When you hit start, then it dies about 2 or 3 seconds after what is probably full speed.

CAPCOM We understand your question Bob, we'll get back to you in a second.

SPACECRAFT Okay Bob, I have brought to press, my suit pressure has climbed to 3.8 on the gage, 3.6 on the D&C panel and it seems to have leveled off there, not 4.3.

CAPCOM Okay Bill we copy you're at 3.8 and 3.6.

SPACECRAFT That's affirmative Bob, and you want us to do the leak check yet?

CAPCOM That's firm Bill go for the leak check there.

SPACECRAFT Okay, 02 actuator to press...

END OF TAPE

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CAPCOM That's affirm Bill. Go for the leak check there.

SPACECRAFT Okay, 02 actuator perss. Houston, Columbia.

CAPCOM Go ahead, Columbia.

SPACECRAFT Bob, just one more clarification on the hydraulic thermal conditioning, the next step that comes up, all you want me to do is throw the radiator out-temp to normal. And do not shut off the circ pumps, is that correct.

CAPCOM That's correct, Vance. Columbia, this is Houston.

SPACECRAFT Go ahead.

CAPCOM For Bill, we'd like to repeat that check and terminate the leak check and lets go and see if we can get four point three in the suit.

SPACECRAFT Say that again. We're in the purge now. You want to go back and do the leak check again?

CAPCOM Bill, we would like to see if we can get 4.3 psi in this suit and then try the leak check at 4.3.

SPACECRAFT Okay, its, we'll just stuff the purge valve now in.

CAPCOM Okay. Bill, your suit pressure was stabalized at 3.8, wasn't it?

SPACECRAFT Yes, my gage was 3.8, (garble). The digitals were 3.6 and it stayed there throughout the whole leak check and was stable there prior to that.

CAPCOM Okay, that sounds okay. Let's see if we can get it up to 4.3 then.

SPACECRAFT Okay, its climbing past 2, at this time. Okay, Bob, here I am and again I'm more or less stable on gauge at 3.8 and a digitals of 3.6.

CAPCOM Okay, Bill copy the same numbers.

SPACECRAFT I'd give it a while longer and see if it climbs up, but it seemed to approach these numbers asemthodicaly and than sit right here.

CAPCOM That's okay, Bill. We've got about a minute left on this pass.

SPACECRAFT Okay, and after LOS what do you want me to do?

CAPCOM Just standby, we're still talking about it.

CAPCOM Columbia, this is Houston. We're about 15 seconds until LOS. We'll talk to you next thru Dakar and ...

SPACECRAFT Okay, yep.

CAPCOM Bill why don't you go ahead and go into the purge mode on the suit and we'll talk to you in Dakar.

SPACECRAFT Okay, good that will get the pre-breathe started even if we keep trying to leak check.

CAPCOM That's affirmative.

PAO This is Shuttle Control, Bermuda has loss of signal. Columbia's next acquisition thru Dakar, in just over 4 minutes. Plan now would be for Bill Lenoir to depress the airlock, open the hatch to the payload bay, but not to get out of the airlock. To remain in the airlock, this would give a test of the extravehicular mobility unit. We'll standby for Dakar at 3 hours, 3 days, 23 hours, 7 minutes mission elapsed time. This is Shuttle Control Houston. This is Shuttle Control at 3 days, 23 hours, 10 minutes mission elapsed time. We have acquisition thru Dakar now.

CAPCOM Columbia, this is Houston with you thru Dakar for 8 minutes.

SPACECRAFT Roger, Houston.

SPACECRAFT Bob, this is Joe, do you copy?

CAPCOM Yeah, Joe your loud and clear go ahead.

SPACECRAFT Interestingly enough, I'm curious as to what might be wrong with the fan? What is the best guess right now? It really sounds sick, and it did from the time I turned it on.

CAPCOM Okay, Joe, we just don't have hypothesis right now. There are a couple of prevalent ideas, but I'd just not speculate right now.

SPACECRAFT Okay, that's probably fair. It almost looks as though, the fans mechanically hitting something, maybe that something is water inside and there is clearly a controller on it of some kind because the controller causes it to draw less and less current until finally the controller just turns it off and it maybe turning it off and it maybe turning it off because its overheating, I don't know.

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SPACECRAFT and maybe turn it off because it's overheated, I don't know.

CAPCOM Okay, we copy Joe. Meantime we'd like to get the EMU status check from Bill.

SPACECRAFT Okay standby. Okay, O2 position is press, EMU check, time EV nothing, 100% power left, time left at 7.01, 90% O2 left, 100% power left, bat volt 20.4, CO2 0.9, water temp 90, PGA pressure 0.5, O2 pressure 774, airlock pressure 14.8, water gas press 14 4, water press 15 1.

CAPCOM Okay Bill we copy the numbers. Hey Bill, what we'd like you to do now is pressurize the suit and lets stabilize it about 3 minutes.

SPACECRAFT Okay, purge off is coming closed. Houston, Columbia.

CAPCOM Go ahead Columbia.

SPACECRAFT Roger Bob, what time today is the live TV pass, VT?

CAPCOM Standby Vance I'll have to dig out my cap.

SPACECRAFT Oh, I found it, never mind. I thought it wasn't on our message, but it is.

CAPCOM Okay Vance, that's what we were going to read it off from.

SPACECRAFT Okay, 0020.

CAPCOM That's affirm and you're coming through Goldstone and Mila.

SPACECRAFT Right. Okay Bob, it's more or less stabilized again at 3.8 and 3.6 and my clock here stopped, I don't know how long I've been at this.

CAPCOM Okay Bill I show that you have about another minute left on that 3 minutes.

SPACECRAFT Okay give me a holler when you think I'm there.

CAPCOM Okay.

SPACECRAFT That's the one thing I forgot to reset last night was to wind the watches.

CAPCOM Columbia, this is Houston. We'd like to get Bill back in the purge mode on the suit and we'd like to talk to you

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at Botswana, UHF only site so we'd have to reconfigure to primary UHF frequency.

SPACECRAFT Okay we're on that now, 259 7 and we're on simplex.

CAPCOM Okay Vance we're about to get Botswana and we've got about 2 minutes left on the pass at Ascention.

SPACECRAFT Okay. And Bob I'm on purge now and the 3.8 and 3.6 held up thourghout that 3 minutes.

CAPCOM Okay Bill we copy. Columbia we're at 30 seconds to LOS at ascension, we'll talk to you through Botswana at 2328.

SPACECRAFT Okay Bob we copy.

PAO This is Shuttle Control. Columbia's out of range at ascension, next acquistion is Botswana in 6 minutes. A check on Lenoir's suit is continuing, we'll be back at Botswana. At 3 days 23 hours 22 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control, we have acquisition through Botswana now.

CAPCOM Columbia, Houston with you through Botswana for 5 minutes.

SPACECRAFT Okay Bob we copy. And Bob just for your info, we're starting to get a little dew on the starboard aft window that looks out on the payload bay. It's getting cold in this attitude apparently. We have a spot of, just moisture, on the glass, I'd say it's about 3 inches in diameter.

CAPCOM Firm Vance, we copy 3 inch diameter spot.

SPACECRAFT And I'm installing an airbaffle to get rid of it.

END OF TAPE

CAPCOM and so copy 3-inch diameter spot.

SPACECRAFT And I'm stalling the air baffle to get rid of it.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead Bob.

CAPCOM Okay, you've got some bad news for you. We're going to have to terminate the EVA prep. Bill's suit reg is just regulating too low for us to continue with that, but we would you to do some troubleshooting. We'd like to get Joe's suit pressurized and see if Joe's regulator is working at the same level.

SPACECRAFT Okay Bob, we copy. This isn't our day for suits, Bob.

CAPCOM You know how Monday mornings are.

SPACECRAFT (laughter) I guess you're right. Okay, pressurize my suit without me in it, I assume, because it's hot in there without that fan.

CAPCOM That's affirm Joe, without a Joe in it.

SPACECRAFT Okay, I catch on quick.

Does that mean you're done with me and I ought to get out?

CAPCOM That's affirm Bill. And Columbia, the reason we're just wanting to pressurize Joe's suit is just to see if we got a generic regulator problem, or whether we've got a zero g problem, or we just don't know what to do about it right now.

SPACECRAFT Okay Bob, I understand, and just for drill I'm repressurizing my suit in some blind hope.

CAPCOM Understand Bill.

SPACECRAFT And Houston, we just got a hardware alarm. No software alarm. It looks like cabin atmosphere probably. I think we have a high cabin pressure, you might look.

CAPCOM Okay Vance, we'll check it. Well Vance, we don't see anything down here, I think that's probably a good analysis on your part though, we've been doing a lot of suit purges and the cabin is warming up a little bit, so it's probably a cabin press. And Vance, if you continue to be concerned, you can go to R13 and do a memory read and make sure it was a cabin press.

SPACECRAFT Roger, we'll look in to it. Hey Bob, if I press my head over to the very far left in my helmet I can get the gauge up to 3.9, would that matter?

CAPCOM Good try Bill.

SPACECRAFT To the top of the gauge.

CAPCOM Good try, but no cigar.

SPACECRAFT Somehow I knew.

CAPCOM And Columbia, we're at 10 seconds from LOS. We'll talk to you next through Yarragadee at 2 3 4 6.

SPACECRAFT Okay, see you at Yarragadee.

PAO This is Shuttle Control. Columbia out of range at Botswana. Next station is Yarragadee in 12 minutes. Equipment problems have force a scrub of STS-5 extravehicular activity. A fan in Joe Allen's EMU does not operate properly, and apparently a regulator on Bill Lenoir's suit is regulating low. The suit pressure reached only 3.8 when it should have been between 4.2 and 4.4. So there will be no EVA today. Originally it had been hoped after the fan malfunction that Bill Lenoir would have been able to depress the airlock and open the hatch, but not leave the airlock so that the test of the EMU could be achieved in that manner. However, that is not possible now with the regulator problem. We have asked them to pressurize Joe Allen's suit, and check the regulator on that suit. Give the experts here on the ground some data as to whether it is the generic to the regulator or whether it may be a zero g problem or some help on trying to run down the cause of the problem. In any event, there will be no extravehicular activity today. At 3 days 23 hours 35 minutes mission elapsed time, this is Shuttle Control Houston.

END OF TAPE

PAO 3 days 23 hours 35 minutes mission elapsed time.
This is Shuttle Control Houston. This is Shuttle Control at 3
days 23 hours 46 minutes.

CAPCOM with you through Yarragadee for 7 minutes.

SPACECRAFT Houston. Bob or Roy, want to make sure that you
wanted the suit check done on Allen's suit in the no vent
position on the helmet, is that affirm?

CAPCOM Standby Bob, let me get back to you.

SPACECRAFT We did it once in a no vent position and at the
rate we're locked up at 4.1. The suit, of course, did not
pressurize because we're in the no vent position but the
regulator locked up at 4.1 I say 4 decimal 1.

CAPCOM Okay, copy that, Bob, standby.

SPACECRAFT And Bob, some little time I am thinking about but
we can't get it to pressurize the suit when it's in the NOT, the
no vent position.

CAPCOM Okay, we copy, no pressurization in the normal
position.

SPACECRAFT For some reason I'm trying to think why that is.

CAPCOM Columbia, this is Houston, we'd like you to put
the helmet in the normal position and try to pressurize again.

SPACECRAFT That's what we're doing. It's in the normal and
we can't get it to pressurize.

CAPCOM Okay. Columbia, this is Houston, would you verify
that all the suit connections are still firm, the gloves, the
waist ring, etc.

SPACECRAFT We're checking those.

CAPCOM And the purge valve.

SPACECRAFT Gloves are very firm.

CAPCOM How about the purge valve Bob?

SPACECRAFT Yes, when the put the purge valve up it doesn't
flow. It's just not flowing at all.

CAPCOM And also the helmet purge, Bob.

SPACECRAFT Nothing flowing there either.

CAPCOM Okay.

SPACECRAFT Okay, Bob, just a recap, we've got the suit on and all the joints locked well. Got the helmet in the normal position. Secondly, depress lever to press, and right now we've got the helmet purge valve open. There is no flow apparent at all that we can see at this point. Back to lock on the helmet flow.

CAPCOM Hey Bob, we'd like you to close the helmet purge valve and let's wait for about 3 minutes and see if we can get some pressure there.

SPACECRAFT Alright, suppose it doesn't act like it's doing anything. It's not flowing anything.

CAPCOM It might take a while to pressurize Bob. We'll give it about 3 minutes and see what happens.

SPACECRAFT I agree that it'll take a while to pressurize the do you expect that needle to start coming off the peg a little bit .

CAPCOM Bob, for your information. The reason we're waiting so long is that when there is a body in this suit it takes a quite a bit of the volume and with all that free volume in the suit now expected take quite a while to pressurize.

SPACECRAFT Okay, Bob, but I can't hear anything flowing. I guess that's what's got me concerned more than anything. And Bob, one thing to note, on both suits the O2 actuator lever has been very difficult to work in getting mine from off to press the first time it was very difficult to go in that direction. And then once I got into press, from press to off was easy but from off to IV was very, very difficult. And, in general, you can go from off to 1 side, but going the other way is very difficult until you set some sort of pattern. And then it doesn't like to go the other way. And, of course, we never tried the EVA position.

CAPCOM Okay, we copy those comments Bill and for Vance, we'd like to get a check on the cabin pressure.

SPACECRAFT Okay, standby 1. And Bob for your information I am now out of the prebreathe, they got my helmet and gloves off, I'm coming out. Cabin pressure is 15.2.

CAPCOM Okay, Vance, 15.2. And Columbia, we're approaching LOS. We'll talk to you next through Hawaii.

SPACECRAFT Roger, and understand the TV will come up at Goldstone.
END OF TAPE

CAPCOM And Columbia we're approaching LOS, we'll talk to you next through Hawaii.

SPACECRAFT Roger, and I understand that the TV will come up at Goldstone through Mila, is that right?

CAPCOM That's affirmative Vance, and Hawaii will be coming up at 11 minutes.

PAO This is Shuttle Control. Yarragadee has loss of signal, next acquisition through Hawaii in 17 minutes. Columbia will be in orbit number 65 before reaching Hawaii. Bill Lenoir getting out of his pressure suit now and still attempting to pressurize Joe Allen's suit to check the regulator on that suit. We expect some television during the next pass over the continental United States through both Goldstone and Merritt Island stations. At 3 days 23 hours 55 minutes mission elapsed time this is Shuttle Control Houston.

PAO This is Shuttle Control at 4 days 10 minutes mission elapsed time, Columbia up on acquisition through Hawaii.

CAPCOM Columbia, Houston with you through Hawaii for 8 minutes.

SPACECRAFT This is Columbia loud and clear.

CAPCOM Roger, you're loud and clear.

SPACECRAFT And Roy we never got any pressures to show up on Joe's suit at all off.

CAPCOM Roger copy, no pressure on the suit.

SPACECRAFT How many minutes do we have on this pass with Goldstone and Mila?

CAPCOM Okay, we've got 6 minutes on the Goldstone pass, we have a break for about a minute and a half and then we have 7 and a half minutes on Mila.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. Columbia, Houston, we would like for you to check Joe's suit and make sure that the LiOH cannister was installed.

SPACECRAFT Okay, you hit it. This is Columbia.

CAPCOM Go ahead.

SPACECRAFT Roger, we reset the limit on cabin press causing a warning, we set the software upper limit to 15.6 and the hardware to a tenth of a volt higher.

CAPCOM Okay copy software to 15.6, I did not copy the hardware.

SPACECRAFT 3.9 volts.

CAPCOM Roger, copy.

SPACECRAFT Didn't know what that would buy us Roy, but we decided to go ahead and just move it up a little bit, it was 3.8 we set it at 3.9 and I figured what we could tell you, you could tell us what we did it on.

CAPCOM Roger.

SPACECRAFT We're starting to get continuous alarms Roy.

CAPCOM Roger Vance, we are getting a little concerned about the cabin pressure increase and also that's why after you checked this LiOH cannister, if the suit doesn't start pressurizing pretty quickly we would like to accommodate that activity.

SPACECRAFT Okay, we got that Roy.

CAPCOM Columbia, Houston, do you have anything set up for TV at Goldstone, what we'd like to know is whether or not you're going to be doing live or VTR?

SPACECRAFT We started to change gears but we're working up something live for you Roy.

CAPCOM Okay, that's great Vance.

END OF TAPE

SPACECRAFT We started change gears but we're working up something live for you Roy.

CAPCOM Okay, that's great Vance.

SPACECRAFT You hear me at all. Yes, good, yes wonder if he's reading me. I'll just start. Yes. Okay.

CAPCOM Columbia, Houston, we're 20 seconds LOS. We'll be seeing you at Buckhorn at 21 and reminder we see the TV in the panel mode.

SPACECRAFT Roger. We'll put it in. Roy, did you hear any of my comments onboard here when we went to VOX box on mine.

CAPCOM We're going LOS, Bob, I'll talk to you at Buckhorn in just a couple of minutes.

PAO This is Shuttle Control. Hawaii has loss of signal. Buckhorn is next in about a 1 minute and 1/2 and then when we have Goldstone AOS we expect television. Live television from Columbia. When we came up on Hawaii Joe Allen's suit still had not been pressurized. Apparently, the lithium hydroxidide cannister had not been replaced. When that is done at it is believed that it will pressure. Excess oxygen has been dumping into the cab and causing the cabin pressure to rise slightly. We're about less than a minute away from acquisition through Buckhorn now. We'll standby for the pass over the United States.

CAPCOM Columbia, Houston, with you through Buckhorn for 8 minutes. Columbia, Houston, with you through Buckhorn for 8 minutes.

SPACECRAFT Roger, Houston, how do you copy this?

CAPCOM Okay, we copy you 5 by now and while we're waiting to come up Goldstone like for you to reconfigure to standard UHF configuration. AIR, audio center UHF air to ground 1 and 2 to off.

SPACECRAFT Standby a minute Roy. Television is coming up first. We're all about here in the flood in middeck.

CAPCOM Okay, Roger, we've got a picture now.

SPACECRAFT Okay, do you have the middeck or do you have the out the window picture?

CAPCOM Got a good shot of you on the middeck.

SPACECRAFT Okay, Roy, I thought this morning since we've had

a little change of plans here I thought I might demonstrate to you and to everybody else in activity that we have to do every morning here on Columbia and the millions of American men I'm sure at this very moment are getting out their razar blades and getting ready to do a little shaving. So if you'll bear with me I'll go ahead and demonstrate it to you. First of all, we have our dop kit that we take the shaving cream out of. Do a quick lather up there. Never have to worry about putting things back for awhile. If you want a little bit of water we just reach over and grab the water gun. And we go ahead and start shaving. And since we don't want things to get too far away we just go ahead and reach back and grab that. Grab the razor. So you see, Mac is all over. It's very needy that we keep a clean shaven face up here and we're real it's real simple to do and real easy and the fast gives it a very not a very difficult task at all. We just go ahead and keep our feet planted on a spot on the floor and keep them pulled away. Cause if we don't do that we'd just float right out of the picture.

CAPCOM Good show Bob. You look very proficient at that exercise. Joe, we are not getting audio.

SPACECRAFT Okay, Roy, What's funny is that I'm too young to shave but I'm not too young to play with toys and we have 1 or 2 aboard that are interesting demonstrations of zero gravity. As a matter of fact, Columbia depends on devices like this working all the time, not toys necessarily but gyroscopes. And I'd like to show you a couple.

CAPCOM We've lost your audio (garble).

SPACECRAFT Yes, I'm sorry. It's a small one, a rather normal gyroscope that I hope you can see.

END OF TAPE

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SPACECRAFT ...gravity. As a matter of fact, Columbia depends on devices like this working all the time, not toys necessarily, but gyroscopes and I would like to show you a couple.

CAPCOM We've lost your audio there, Joe.

SPACECRAFT Yeah, I'm sorry. It's a small one, a rather normal gyroscope, that I hope you can see. Are you holdin it? And it has no stability at all, until you spin it. But once run, its usually stable. It remembers which way its going, that was of course the principle on which the satellites which we launched a couple of days ago, is based. The remain stable just like that. Houston, another interesting gyroscope, with beautiful stability like that. It also is stable. Like that one, turn it on and then, this is like a book, its shaped like a book as you can see. But if we put it sideways like this it has a rather peculiur property. It doesn't like to stay stable at all.

Like some people we know.

Okay, I hope you can see that.

CAPCOM Got a great picture, Joe. And Joe, GNC is computered a gyrodrift compensation, you'll be uplinking.

SPACECRAFT Very good. See how it goes.

CAPCOM We've lost your audio, Joe.

SPACECRAFT Okay Roy, we're getting some outside pictures which we can send down to you in a few minutes. Bill has a model of the payloads we deployed, and we haven't challenged it, but we can get it to spin pretty well. Hang on just a minute.

CAPCOM Okay, Joe. We've lost your picture and will pick you up in Mila in just a couple of minutes. I'll let you know when we've got you back again.

SPACECRAFT Okay.

CAPCOM And Columbia, Houston. Reminder, we have no control over the TV. You all still have it in the panel.

SPACECRAFT Roger.

CAPCOM Columbia, Houston, with you thru Mila for 7 and 1/2 minutes and we have a TV picture back.

SPACECRAFT Roger, Roy. Bill's got a model, a U-jets, I think your looking at him now.

CAPCOM Roger, we see it.

CAPCOM That's also a gyro-scope. And we'd caused it to

spin before we deployed it the other day, both of them. And because it was spinning, it was very stable. And when it fired its large rocket engine. This one isn't very well balanced, but this is basically what it looked like. And then after the large rocket down here at the bottom fired, it separated and contained a spin in its transfer orbit until the apogee burn from the motor on the top here, and then eventually the aft skirt deployed and the omni deployed. And this is the way it looks right now, they both look, with the antennae pointing right towards Earth, always towards Earth. And the cylindrical part of the satellite spinning and drawing power from the sun because the cylinder is mostly solar cells around the outside. That's where it gets its energy.

CAPCOM Great show, Joe and Bill.

SPACECRAFT Okay, and we're steering one of the cameras down towards the ground, one of the payload bay cameras. We'll see what we can pick up from there in a moment.

Okay Roy, we have the terminator coming up and one of our aft cameras, here you can see it. We're coming up to cross shortly the Monterrey Coast. Directly over Monterrey, probably over the Gulf of Mexico and will be coming up on the Florida peninsula before too long. And if our calculations onboard are correct, we'll be going right over the launch site sometime here on this pass.

CAPCOM Okay, Bob. ...

END OF TAPE

SPACECRAFT ..directly over Montrey, probably over the Gulf of Mexico, it'll be coming up on Florida peninsula where you are. And if our calculations on our board are correct we'll be going the launch site sometime here on this pass.

CAPCOM Okay Bob we have a very good picture.

SPACECRAFT Okay. And Roy while we're sitting here looking at the Earth let me tell you about Joe's suit. We did get it reconfigured and it pumped back up to 4.4 and 4.3 on the gage and the digital respectively.

CAPCOM Okay we copy, 4.4 and 4.3.

SPACECRAFT (garble) Gulf of Mexico we can look up ahead and see some beach area of, toward the north of us, looks like there's an awful lot of cloud cover down in this area and probably will not get much of a sight of Florida, I'm afraid. A tremendously spectacular view Roy when you stand here, or better float here over top the upper window looking right down in the ground area here with all the cloud cover and looking on the Florida coast.

CAPCOM Well it looks pretty fantastic from here too Bob.

SPACECRAFT Yes, we'd wished we had a little more time to prepare for this TV but of course we had the unfortunate problem with the equipment on the, for the space suits and had to scrub the walk which kind of put a (garble). Right now we're coming up on a very beautiful coral looking right out our right wing, left wing, we had been looking down, we see some Islands and some very clear green coral waters, it's just a beautiful area to go scuba diving it looks like. Yes, that's actually the southern coast of Florida it looks like and, or, area around the southern part of Florida the water's very green, and a lot of shallows down there, with the eye it's just beautiful, all shades of green and blue which the camera can't quite pick up. Roy, how much more time do we have on this pass?

CAPCOM Okay Vance, we've got you for about 2 and a half more minutes of TV time.

SPACECRAFT Okay, Bob's digging out the map right now. The, just exactly where we are in this, oh yes it's the Bahamas, very striking. Just came over the tounge of the Ocean. Looks like, I have to admit that when you go around the world once in 90 minutes that it's hard to keep track where you are or exactly what point over Florida you may cross. Sometimes up there we're wondering if we're in one place and we passed it about 5 minutes ago and we're probably hundreds of miles passed it. Roy looking out the side window, looks like we just came over Bahama, tounge

of the Ocean and the Eastern tip of Cuba. Now you'll like, what we'll do is we'll give you a view of our payload bay which is in a shadow, you can see the Earth behind it, got to tilt the camera up a little bit and you can see the tail, a vertical fin, the payload bay is in a shadow, the cap like looking device you see directly back, is the covering of to keep the house the satellites that we deployed a couple or three days ago. And Roy, you might think that we painted the upper most part of the tail white, it's just the part that's up in the Sunlight and the (garble) of the forward part of the Orbiter has been right across the vertical stabalizer for a number of hours now and it doesn't move parently an inch. The Orbiter is that stable as it travels around the Earth.

CAPCOM Certainly a beautiful picture guys and Orbiter being very stable certainly helped us get those satellites off and in fine shape the other day.

SPACECRAFT Hey Roy, I've got a question on the suit. Did you want us to secure and pack everthing up, or should we anticipate some more trouble shooting.

CAPCOM Standby Bill.

SPACECRAFT Okay, we're starting to go over the Atlantic now and I guess we'll get back into the swing of the work stage here, we look forward to returning tomorrow.

CAPCOM Roger and in answer to the question, we'd like for you to go ahead and stow the suits, we're finished with our toubleshooting.

SPACECRAFT Okay we'll make all the comments in our log books and talk about it when we get back.

CAPCOM Okay, that'll be great and we're about to go LOS and just lost the picture. See you at Ascension at 5 0.

SPACECRAFT Okay. Sorry we didn't have time to practice that a little bit.

END OF TAPE

CAPCOM We're finished with our troubleshooting.

SPACECRAFT Okay, put all our comments in our log books and talk about them when we get back.

CAPCOM Okay, that will be great. We're about to go LOS and we just lost the picture. See you at Ascension at 5 0.

SPACECRAFT Okay. Hey we are sorry we didn't have a chance to practice that a little more.

PAO This is Shuttle Control. Bermuda has loss of signal. Columbia on orbit 65 with next acquisition with Ascension Island in 10 1/2 minutes. Rather long series of television during this pass thru Goldstone and Merritt Island, Florida. Both within the cabin and Earth shots, payload bay shots. Crew reporting that Joe Allens suit has pressurized properly to 4.3 and 4.4. Those suits are now being stowed. Troubleshooting is complete on that, for the time being. Until after the mission. At 4 days, 40 minutes, mission elapsed time, and this is Shuttle Control Houston. This is Shuttle Control. Columbia coming within range of the Ascension Island Tracking station now.

CAPCOM Columbia, Houston with you thru Ascension for 7 minutes.

SPACECRAFT Okay, Roy. Loud and clear at the moment. Bill and Joe are putting away to suits. I'm looking out the window taking pictures and we're cleaning up around here.

CAPCOM Okay, Vance. We'd like to reverse course just slightly, we're getting a few ideas in that might pay-off in additional troubleshooting on the suits and we wondered if may be we could terminate closing out the suits until about 4 days and 3 hours. We won't hold you longer than that.

SPACECRAFT Okay, Roy. Tell you were we are right now. I'm in the airlock writing my notes down between the suits. Joe's suit is still pressurized from the previous test, it has been in off for over 1/2 an hour and he is still indicating 4.3 and 4.2 gage and DCM, respectively. Mine is still also pressurized having been off for about 30 or 45 minutes now. It's indicating 3.5 and 3.4 gage and DCM, respectively. And they are just sitting here, we haven't done anything else. SCU power is on, but that's all.

CAPCOM Roger, we copy.

SPACECRAFT Houston, Columbia. You still there.

CAPCOM Roger, Columbia, Houston. And standby we're checking to make sure this is a good suit configuration to leave

them for a while.

SPACECRAFT Okay, and do you cancel the remaining two live TV passes since we won't have an EVA?

CAPCOM Vance, we'll let that be your call.

SPACECRAFT Okay, I think we might as well because the EVA was going to be super interesting, we'll be just sort of picking up around the house and doing a little testing today.

CAPCOM Roger Vance. We concur with that was a great TV show you put on for us this last pass, and we really appreciate it. That is a good configuration on the suits, so you can just hold on doing anything else with them for a while.

SPACECRAFT Okay, just to clarify. I've got mode power and looks like main A on both suits and presently the oxygen is open.

CAPCOM Okay, we copy.

SPACECRAFT We're gonna go ahead and turn the audio power off though.

CAPCOM Roger.

CAPCOM Columbia, Houston. Bill we'd like for you to power the suits down and turn off the 02 and hold there.

SPACECRAFT Okay, in work.

CAPCOM Columbia, Houston. Vance I've got a couple of clean up actions on the UHF reconfiguration and voice recorder reconfiguration on Panel AlR.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, on panel AlR, we'd like to take the audio center UHF air to ground one and two to off. And also..

SPACECRAFT Okay say it again, Roy please. I'm over here now.

CAPCOM AlR audio center UHF air to ground one and two to off.

SPACECRAFT Okay, their off.

CAPCOM And also, voice record channel two to ICOM B.

SPACECRAFT Okay, you got channel two, I copy, I'm sorry I missed those a minute ago.

CAPCOM And also.

SPACECRAFT (garble). They said they got (garble) I'm over here now.

CAPCOM Okay, Al R audio center UHF air to ground 1 and 2 to off.

SPACECRAFT Okay, they're off.

CAPCOM And also voice record channel 2 to ICON B.

SPACECRAFT Okay, you got channel 2 ICON B, (garble) I copy. I'm sorry I missed those a minute ago.

CAPCOM And on panel R10 we'd like to take the biomed switches 1 to mike delta charlie and 2 to mike delta romero.

SPACECRAFT Okay, you were cut out with the static, say channel 1 again please.

CAPCOM Middeck center and number 2 to middeck right.

SPACECRAFT Okay, we've got it. And Roy, Bill again. Do you want me to top off the batteries with a charge or just leave as is.

CAPCOM Standby.

SPACECRAFT Roy, one cleanup item from last night. We did the checkout on the DEU and it checked out absolutely nominal.

CAPCOM Okay, we copy that Bob, and thank you for the info. Columbia, Houston, Bill for the exercise, you can go ahead and top off the batteries on both suits if you like.

SPACECRAFT Okay, in work.

CAPCOM Columbia, Houston, we're 45 seconds LOS. We'll see you at Botswana at 1 hour and 1 minute.

SPACECRAFT Okay. See you there.

PAO This is Shuttle Control. Columbia's out of range at Ascension headed toward acquisition through Botswana in 3 minutes. At 4 days 57 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 4 days 4 days 1 hour mission elapsed time. Shuttle Columbia about 55 seconds away from acquisition through Botswana. At 7:30 a.m. Central Standard Time in Room 135, that's the press briefing room at the Johnson Space Center News Center. Glynn Lunney the Space Shuttle program manager will brief on EVA status. That's a

briefing on EVA status by Glynn Lunney, the Shuttle Program Manager at 7:30 a.m. central standard time in room 135 of the JSC news center. We'll standby for acquisition through Botswana.

CAPCOM Columbia, Houston, with you through Botswana for 7 minutes.

SPACECRAFT Roger, Houston, we're getting PPO 2 alarms and the changing the limits, hardware and software.

CAPCOM Roger

SPACECRAFT temporary limits from a value of 3.60 on PPO 2 alpha and bravo, to 3.70, what does that come out in actual PPO 2?

CAPCOM Standby, we'll let you know.

SPACECRAFT Okay.

SPACECRAFT And Roy, we have changed the address IDs for the PPO 2 alpha and bravo on the back up caution and warning to 3.75 for temporary, so we won't get harrassed here.

CAPCOM Roger.

SPACECRAFT And Roy, just for information, we're showing this possible situation with the Airlock press on spec 66 as 15.8 with an up arrow, and cabin press at 15.3 and I guarantee you the door's still open, so.

CAPCOM Okay.

CAPCOM Columbia, Houston, that's our ducer bias, and we've been monitoring that all along. So, no reason to be alarmed.

SPACECRAFT We really weren't, cause we didn't think it was physically possible.

PAO This is Shuttle Control, with a reminder that Glynn Lunney, the Space Shuttle Program Manager will brief on EVA status at 7:30 a.m. central standard time in the JSC news center, room 135.

CAPCOM Columbia, Houston, we're about 20 seconds LOS, and we'll be seeing you at Yarragadee at 22. And for your information, Bob, in answering to your questions, they're 3.7 volts on PPO 2 is a 3.7 psi PPO 2.

SPACECRAFT Okay, super.

CAPCOM Columbia, Houston. We're about 20 seconds LOS and we'll be seeing you Yarragadee at 22. And for your information, Bob, in answer to your question, a 3.7 volts on PP02 is a 3.7 psi PP02.

SPACECRAFT Okay. Super.

PAO This is Shuttle Control. Columbia is out of range at the Botswana station now. Next station, Yarragadee in 13-1/2 minutes at 4 days, 1 hour, 9 minutes mission elapsed time. This is Shuttle Control, Houston.

PAO This is Shuttle Control at 4 days, 1 hour, 22 minutes mission elapsed time. We're standing by for acquisition through Yarragadee.

CAPCOM Columbia, Houston. With you at Yarragadee for 4 minutes.

SPACECRAFT Columbia, over.

CAPCOM Okay, Vance. I copy part of your transmission. We get a low elevation pass here.

SPACECRAFT Understand.

CAPCOM And we have nothing for you.

SPACECRAFT Okaya. We'll just keep standing by.

CAPCOM Roger.

SPACECRAFT And, Roy, we've left the suits locked up the way they were in the airlock.

CAPCOM Okay. Understand, Bill.

SPACECRAFT And, Roy, we haven't talked about landing for several days. I presume it's still 22 at Edwards. Is that right?

CAPCOM That's affirmative, Vance. And, Vance, everything looks real good for Edwards tomorrow.

CAPCOM Columbia, Houston. 30 seconds LOS. We'll see you at Guam at 33.

SPACECRAFT See you at the next, Houston.

PAO This is Shuttle Control. Columbia has loss of signal at Yarragadee. Next acquisition through Guam in 6-1/2 minutes. At 4 days, 1 hour, 26 minutes mission elapsed time, this is Shuttle Control, Houston.

PAO This is Shuttle Control at 4 days, 1 hour, 32 minutes mission elapsed time. Columbia coming up on acquisition at Guam and Columbia will begin its 66th orbit of the Earth at acquisition.

CAPCOM Columbia, this is Houston with you through Guam for 7 minutes.

SPACECRAFT Roger, Houston. Hear you over Guam.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead, Bob.

CAPCOM Yeah, Bob. Could you tell me where your current PP02 on caution/warning alarm level is set?

SPACECRAFT Again, Bob. You want our PP02 caution/warning?

CAPCOM Yeah. The PP02. Have you gone back to 3.6?

SPACECRAFT Say again, Bob. You're coming through broken.

CAPCOM Yeah, Bill. Have ya'll gone back to 3.6 on the PP02 caution and warning?

SPACECRAFT No we haven't.

CAPCOM Okay. Thank you.

CAPCOM Columbia, Houston. We're 30 seconds til LOS at Guam. We'll see you next at Hawaii at 01:47.

SPACECRAFT Okay, Bob. See you at Hawaii.

PAO This is Shuttle Control. Columbia has moved out or range of Guam headed toward Hawaii. That station will pick up Columbia in 6 minutes. At 4 days, 1 hour 41....

END OF TAPE

PAO This is Shuttle Control. Columbia has moved out of range of Guam headed toward Hawaii. That station will pick up Columbia in 6 minutes. At 4 days, 1 hour, 41 minutes mission elapsed time this is Shuttle Control, Houston.

PAO This is Shuttle Control at 4 days, 1 hour, 46 minutes mission elapsed time. Columbia coming up on acquisition through Hawaii.

CAPCOM Columbia, this is Houston, with you through Hawaii for 7 minutes.

SPACECRAFT Hi. We're still here.

CAPCOM Glad to hear, Bill.

SPACECRAFT Just standing by, Bob. We don't have anything for you. We're taking pictures and setting up some cameras.

CAPCOM Do I hear a motorboat in the background?

SPACECRAFT I think what you hear is somebody's wireless comm battery going bad.

CAPCOM Okay.

SPACECRAFT You might hear a camera too. A 16 DAC.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead, Bob.

CAPCOM The FAO has come up with a comprehensive plan for completion of this day. Are you ready to copy?

SPACECRAFT Oh, I can hardly wait. Stand by 1. Give us the words overview then we'll copy.

CAPCOM Okay. Overview as follows. Return to nominal CAP at day 4, 02 hours and 10 minutes.

SPACECRAFT Okay. Is that it?

CAPCOM That's it. Only one (garble) after the LVLH test we would like you to return to the nose sun attitude.

SPACECRAFT Okay. Understand. After LVLH test return to nose sun attitude and when then would we go to minus ZLV?

CAPCOM Vance. We'll be going to PTC tonight before you go to bed and that will be your next attitude change.

SPACECRAFT Okay. Understand. Thank you.

CAPCOM You realize that Bill is losing tremendous face with his fellow FAO's for coming up with such a wonderful plan.

SPACECRAFT This - This is beautiful. It has simplicity and we know right where to go to execute it.

SPACECRAFT Right.

CAPCOM That's why Bill is going to be ostracized as an FAO.

SPACECRAFT Houston, we're getting a lot of static now. If you can still hear - little - we're getting some (garble) static. Must be low on the horizon.

CAPCOM Yeah. We're still hearing the static in the background, Van.

SPACECRAFT Bob, you still there?

CAPCOM Yes sir. We're still here for another 2 minutes.

SPACECRAFT Okay. In returning to the day 4, whatever time that was, 2 hours, 10 minutes CAP. From there on I assume that includes all the EVA suit work as well?

CAPCOM Bill. We're coming up with a list of questions for you on the EVA suit work. And we'll just catch that piecemeal as it comes to us.

SPACECRAFT Okay. If they're simple just ask them to us, otherwise if they're complicated you can write them down for us. And we'll hold off on any of the suit work. If it comes up before we talk to you.

CAPCOM And we're trying to get everything consolidated and get a cohesive set of questions to ask you before we come to you with them.

SPACECRAFT That sounds real good. Appreciate it. Let me have...

CAPCOM Columbia, Houston. It's 30 seconds to LOS at Hawaii. We'll talk to you next through Buckhorn at 01:57.

SPACECRAFT Okay, Houston.

END OF TAPE

CAPCOM Columbia, Houston. It's 30 seconds to LOS at Hawaii. We'll talk to you next through Buckhorn at 01:57.

SPACECRAFT Okay, Houston.

PAO This is Shuttle Control. Hawaii has loss of signal. Buckhorn is next in a minute and a half. The crew has been advised to go back to the regular crew activity plans starting at day 4, 2 hours, and 10 minutes. For the rest of today they will follow that nominal crew activity plan. We'll stand by for acquisition at Buckhorn.

CAPCOM Columbia, Houston through Buckhorn for 7 minutes.

CAPCOM Columbia, this is Houston through Buckhorn for 5 minutes.

SPACECRAFT Okay, Bob. We're with you.

CAPCOM Glad to hear from you. Columbia, this is Houston. If you still want to troubleshoot your aft mission and event timers we got some good places for you to check.

SPACECRAFT Okay. Go ahead, Bob.

CAPCOM Okay, Joe. The first one is on panel L4, row K back. AC2 phase Charlie, lighting numeric, OS circuit breaker closed.

SPACECRAFT Okay. Hey, Bob, wait a minute. I'm getting terrible static. Hang on a minute.

SPACECRAFT Okay, Bob. Say it again.

CAPCOM Okay, Joe. That's on panel L4, row K back, AC 2 phase Charlie, lighting numeric, OS circuit breaker should be closed.

SPACECRAFT Okay.

CAPCOM Okay. While you're troubleshooting circuit breakers there you can look overhead on 014 and 015, row Bravo. On 014, row Bravo you should have main A event timer aft, circuit breaker closed.

SPACECRAFT Okay.

CAPCOM Still with me, Joe?

SPACECRAFT (Garble)

CAPCOM Columbia, this is Houston. Your transmission is unreadable.

SPACECRAFT Okay. I found those breakers and they are all closed. Do you want me to pull them or just verify that they are closed?

CAPCOM Okay. On 014 and 015 is the main Bravo mission timer aft? And on panel A6, back there on the orbit station. Orbit station lighting numeric rotary switch. You could try that to full bright, see what that does.

SPACECRAFT Okay. I think we've done all these. Yeah, Bob. We did all these earlier and none of them worked.

CAPCOM Well, we kind of figured you did but we just want to run through the list of what ECOM thought might make it work too.

SPACECRAFT Yeah, we're at the point where we don't need anymore. If we can help you troubleshoot it just let us know. And I have a question on your CAP message.

CAPCOM Okay. Go ahead.

SPACECRAFT When you said start on Mission day 4, hours 2, 10 minutes. Did you mean flight day 4 or mission - MET day 4?

CAPCOM Columbia, this is Houston. We're not receiving a signal down from you.

SPACECRAFT Are you copying me now?

CAPCOM Okay. It's MET day 4, 2 hours, 10 minutes. And it's page 4-82 in the CAP.

SPACECRAFT Roger. Thank you.

CAPCOM And we're about 15 seconds to LOS. We'll see you at Mila at 07.

SPACECRAFT Okay, Roy. See you there.

PAO This is Shuttle Control. Loss of signal at Buckhorn. Merritt Island will pick up Columbia in 3 minutes. We'll stand by for any conversation at Mila.

PAO This is Shuttle Control at 4 days, 2 hours, 6 minutes, mission elapsed time. We're standing by for acquisition through Mila.

CAPCOM Columbia, this is Houston.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead.

CAPCOM Okay, we've got our first check on the suits for you. If someone could go to Bill's suit, put the helmet in no vent position. We'd like to cycle the O2 actuator 10 times, and check the pressure on each cycle.

SPACECRAFT You want the O2 actuator cycle 10 times to what, press, I assume ?

CAPCOM Right cycle that O2 actuator from off to IV, 10 times, and give us a pressure check on each cycle.

SPACECRAFT Okay, understand, you want that from off to IV?

CAPCOM That's affirmative.

SPACECRAFT Okay, standby, it was pressurized, I'm venting it now.

CAPCOM Okay, Bill, we're going LOS, we'll pick up that data from you at Ascension.

SPACECRAFT Okay.

PAO This is Shuttle Control, Columbia out of range at Merritt Island. Heading down over Central America, they'll cross South America on this ground track, with the next acquisition being Ascension Island in 15 minutes. Troubleshooting continuing on the pressure suits. Bill Lenoir being asked to cycle the oxygen actuator on his suit 10 times and get a pressure reading with each time it's cycled. We'll get that information at Ascension. Again the crew has been instructed to return to the nominal crew activity plan, beginning with day 4, 2 hours, 10 minutes. At 4 days, 2 hours, and 11 minutes, mission elapsed time, this is Shuttle Control, Houston.

PAO This is Shuttle Control at 4 days, 2 hours, 26 minutes, mission elapsed time. Standing by for acquisition through Ascension Island.

CAPCOM Columbia, this is Houston with you through Ascension for 5 minutes.

SPACECRAFT Okay, Bob, we're with you again, and I got the results of that test.

CAPCOM Okay, we're ready to copy, go ahead.

SPACECRAFT Okay, I cycled 10 times, from off to IV. And the first 9 times the pressure went to 0.4 on the PGAP indication on the digital, the 10th time it went to 0.5, I did it an 11th time, which came back to 0.4. Each time in cycling back from IV to off, about half way back, you hear a poof, very much like you hear on the SLP check, and at that time the PGAP indication jumped up to about 2.2. It does not occur going from off to IV, and if you stop and hold the select lever in the poof position, as I call it, the pressure will rise about 2.9 to 3.0 and stabilize. And the position will indicate aft dry ampersand to ampersand, blank, echo, over.

CAPCOM Okay, Bill we copy that.

SPACECRAFT Incidentally, Bob, just for the record. My SOP check day before yesterday, came out at 3.5 psi.

CAPCOM Okay, Bill, we copied that, 3.5 day before yesterday. And Columbia, we'd like to get a word down from Joe Allen to check his com.

SPACECRAFT Okay Bob, I'm transmitting from the aft flight deck, how do you read me?

CAPCOM Okay, loud and clear, Joe.

SPACECRAFT We think we've solved our com problem up here, Bob. I changed out some batteries, how do you hear the CDR?

CAPCOM Loud and clear, Vance.

SPACECRAFT Bob, how do you read the PLP?

CAPCOM Got you loud and clear, Bob.

SPACECRAFT Okay.

CAPCOM Columbia, we're 20 seconds to LOS, Botswana is next at 0237.

SPACECRAFT (garble), roger.

PAO This is Shuttle Control, Ascension has loss of signal. Botswana is next in just under 3 minutes. At 4 days, 2 hours, 34 minutes, this is Shuttle Control, Houston.

END OF TAPE

PAO This is Shuttle Control, Ascension has loss of signal. Botswana is next in just under 3 minutes. At 4 days, 2 hours, 34 minutes, mission elapsed time, this is Shuttle Control, Houston.

CAPCOM Columbia, this is Houston with you through Botswana for 7 minutes.

SPACECRAFT Okay Bob, we copy.

SPACECRAFT Going over an unbelievably clear part of Africa right now, Bob.

CAPCOM Glad to hear the weather's going right for somebody today.

SPACECRAFT How's it in Houston?

CAPCOM I don't know, it's always the same inside this room.

SPACECRAFT Oh okay.

CAPCOM Got a plan for you on EVA, if you're ready to copy.

SPACECRAFT Okay, go ahead Bob.

CAPCOM We'd like to do some troubleshooting on both Bill and Joe's suits. And to start this off, we'd like to get Bill suited up into his suit, and to do that, he can go through the procedures on page 2-2, 2-3, and then on page 3-2 he can go down to as far as the EMU purge.

SPACECRAFT Okay, what step on 3-2? (garble)

CAPCOM Okay, he can go through the EMU check and stop before the EMU purge. That's the middle of the second column.

SPACECRAFT Understand, 2-2, 2-3, and 3-2 stop before the EMU purge.

CAPCOM That's affirm. And Bob we'd like to stay hardline com all this time.

CAPCOM We'll get back to you later at Guam with the rest of the plan.

SPACECRAFT Okay, what are we checking out on this?

CAPCOM We're going to eventually looking at a possibility, Bill, not want to confirm anything right now. Trying to break your regulator loose and troubleshooting Joe's suit a little bit.

SPACECRAFT Okay.

CAPCOM And we expect this procedure to take another hour and a half to two hours of your time.

SPACECRAFT Okay, I've got just a couple more bites here and then I'll jump in.

CAPCOM Okay, Bill.

SPACECRAFT The CDR's off the loop right now. What's the plan if the reg does break loose?

CAPCOM That's still in work, Bob. We really don't know, it's just a troubleshooting right now.

CAPCOM Columbia, this is Houston, we're 30 seconds to LOS, we'll talk to you at Guam at 0309.

SPACECRAFT Okay Bob, and we're setting up for the LVLH test.

CAPCOM Okay Bob.

PAO This is Shuttle Control, Columbia is out of range now at Botswana, Guam in 24 minutes. Bill Lenoir is getting back into his pressure suit, going through a couple of pages of the checklist up to the suit purge. At Guam, we intend to pass up additional procedures in an attempt to get more pressure out of the regulator on his suit. At 4 days, 2 hours, 45 minutes, mission elapsed time, this Shuttle Control, Houston.

PAO This is Shuttle Control at 4 days, 3 hours, 8 minutes, mission elapsed time. Guam has acquisition of signal.

CAPCOM Columbia, Houston with you at Guam for 6 minutes.

SPACECRAFT Roger, Roy, and the, we're in the middle of LVLH test and it's really well behaved, working very well.

CAPCOM Okay, and we're happy to hear that.

SPACECRAFT And Roy, I'm in my LCBG just about to get into the suit.

CAPCOM Okay, copy Bill.

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SPACECRAFT And Roy, I gave it, 1 false and roll, but it sure doesn't look like it's getting a tenth of a degree per second. It's rolling in the roll, but I don't think I got a tenth of a degree per second on it, one false.

SPACECRAFT Houston, Columbia, are you there?

CAPCOM Columbia, Houston, it looked like we're residual rates to us, and we've got some message traffic on the EVA procedure coming up. I'd like to take the next 50 seconds for LOS

END OF TAPE

SPACECRAFT Houston, Columbia, are you there?

CAPCOM Columbia, Houston, it looked like residual rates to us, and we got some message traffic on the EVA procedure coming up. I'd like to take the next 50 seconds for LOS to give you a start on that. And then we'll cover the rest of it at Hawaii.

SPACECRAFT Okay, you want me to hit another pulse then?

CAPCOM Yes, go ahead.

SPACECRAFT Okay Roy, I've just gotten into the hard upper torso, and I'm on the hard line Comm.

CAPCOM Okay. Well we'll just go ahead and continue getting into the suit, and you can configure EV2 suit as follows. Check O2 actuator off, open the purge valve, remove and transfer to the middeck, the lower torso in the helmet, then connect EV2 LCGV to the EMU 2 and I'll get back to you at Hawaii with the rest.

SPACECRAFT Okay.

PAO This is Shuttle Control, Columbia is out of range at Hawaii now, at Guam. Next station is Hawaii in 6 minutes. Where additional procedures for checking out both suits will be passed up. At 4 days 3 hours 16 minutes Mission Elapsed Time, this is Shuttle Control Houston.

PAO This is Shuttle Control at 4 days 3 hours 22 minutes, Mission Elapsed Time. Hawaii has acquisition of Columbia.

CAPCOM Columbia, Houston with you through Hawaii for 7 minutes.

SPACECRAFT Okay Houston, we've got you, do you read me?

CAPCOM Roger, your 5 by, and I'd like to give you an overview now on the shoot, troubleshooting.

SPACECRAFT Okay, I'm hanging here in the suit, I don't have the helmet on yet, but I do have everything else connected. The gloves are on.

CAPCOM Okay, good. Okay the basic plan is, after we get Joe's EMU configured properly we're going to depress the airlock to 9 psi and have you do some troubleshooting on the fan, and see if we can get it to operate better in the lower pressure, that's the basic purpose of the thing.

SPACECRAFT Okay that's pretty much what I had guessed although I guessed you might be going to five.

CAPCOM Okay, well good try, and of course we would also hope as a side light that your pressure regulator would work better than it did last time, and one condition for this whole test is that it work as well as it did before.

SPACECRAFT Okay, understand.

CAPCOM Okay, now I gave you the configuration for the EV2 suit, over Guam do you need me to repeat that?

SPACECRAFT No, that's fairly simple, you want essentially the helmet and the lower torso out of here, and you want the LCBG connected, that's the main part of it with the purge valve open.

CAPCOM That's affirmative and make sure you've got power to both suits.

SPACECRAFT Okay.

CAPCOM Okay now, on page 3-2, of your EVA checklist, I'll go over the changes on that page.

SPACECRAFT Stand by one.

SPACECRAFT Okay go ahead.

CAPCOM Okay, Bill, first of all you can delete any reference to pre-breathing in column two and three. Secondly, under IV one procedures in column three you can delete the first five lines. Okay, then under airlock depress, obviously change the 5 to a 9, and following airlock depress valve closed, we want you to add 02 actuator to press, then you can delete the rest of the page. Did you copy that Bill?

SPACECRAFT Okay Roy, did you copy me?

CAPCOM No I didn't copy you, did you get all those changes in column 3.

SPACECRAFT I'm reading them back, IV 1, all of his stuff up there is scratched, and mid page where it says AW82B airlock depress valve 5, change 5 to a 9, and all other references are to 9 psi, and after airlock depress valve closed, 02 actuator press and then delete the rest.

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CAPCOM That's affirmative. Now the rest of the procedure follows. After you have depressed the 9 psi, we want you to cycle the EMU 2 fan switch off and then on and check the current on the panel,

END OF TAPE

SPACECRAFT ...and mid page where it says AW 82B airlock depress valve. 5 change 5 to a 9, then all other references are to 9 psi, and after airlock depress valve closed, 02 actuator press and then delete the rest.

CAPCOM That's affirmative. Now, the rest of the procedure follows. After you have depressed the 9 psi, we want you to cycle EMU 2 fan switch off and then on, and check the current on the panel. It should read 2-1/2 amps nominally. If the current drops to a steady state of 1 amp, you will, of course, know that the fan has dropped off the line. If that happens, we want you to cycle the fan switch off and then back on again and keep repeating the procedure for 30 minutes. And one other note, Bill. If it does stay on with the amps in the nominal range, leave it on for 15 minutes.

SPACECRAFT Okay, Roy. I understand. I'm going to take the EMU 2 fan from off to on. When I get to 9 psi, I'm going to check the current, it should be around 2.5 at that point, (garble) is the fan being off. If it's off, I'll cycle it for 30 minutes and if it's on, I'll leave it run for 15.

CAPCOM That's affirmative.

CAPCOM Okay, Bill. When you complete that procedure or whatever point you get to, we would like for you to hold there until we have comm again and, of course, unless in your judgement you need to terminate for safety reasons.

SPACECRAFT Okay. Understand that. How do you want me to take EV2 suit down with me? Do you want it just on SCA and the fan off?

CAPCOM That sounds good, Bill.

SPACECRAFT Okay.

CAPCOM Okay, Columbia, Houston. We're 1 minute LOS. We'll see you at Buckhorn at 33 and we can go over anything that you have a question on.

SPACECRAFT Okay, Roy. Verify you want me to go down at IV pressure? Or do you want press?

CAPCOM I'll answer that in a second, Bill. But make sure and limit your purge to 12 minutes so we don't raise the cabin pressure too much.

SPACECRAFT I understand that. You want me to go to 9 psi and press or IV.

CAPCOM Okay. Let's go and press.

SPACECRAFT Okay. That's what I thought.

PAO This is Shuttle Control. Columbia is out of range of the Hawaii station. Just barely acquires Buckhorn on this orbit, about a 4 minute pass there, beginning in 2 minutes. Columbia now on revolution 67. CAPCOM Roy Bridges over Hawaii passed up more detailed explanation of the procedure to Bill Lenoir who will depress the airlock to 9 pounds per square inch and attempt to see if the fan on Joe Allen's suit will operate at that reduced pressure. At the same time, they are hoping that the delta in pressures will break loose his actuator, regulator on his suit. About a minute away now from Buckhorn. We'll continue to stand by at 4 days, 3 hours, 32 minutes mission elapsed time.

CAPCOM Columbia, Houston with you through Buckhorn for 4 minutes.

SPACECRAFT Hello, Houston.

CAPCOM You're 5-by.

SPACECRAFT And I'm at 3.8 psi.

CAPCOM Good.

SPACECRAFT And Roy, if you're still there, I just started the 12 minute purge.

CAPCOM Okay. Great, Bill. And for your information we have about a minute and a half to LOS if you have any questions.

SPACECRAFT Okay. Well, I got 12 minutes where I don't think I'm going to have any questions. I'm just going to sit here.

CAPCOM Okay. We've got a long LOS and we won't be up again until about 30 minutes later.

SPACECRAFT Okay. By that time, I should see a 9 psi and tell you what happened.

CAPCOM Okay. That's what we figured.

END OF TAPE

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SPACECRAFT Okay. Well, I've got 12 minutes where I don't think I'm going to have any questions. I'm just going to sit here.

CAPCOM Okay. We've got a long LOS and we won't be up again until about 30 minutes, later.

SPACECRAFT Okay, by that time then, I should see a 9 psi and tell what happened.

CAPCOM Okay. That's what we figured.

CAPCOM Columbia, Houston. We're 30 seconds LOS. We'll see you at Botswana at 04:12.

SPACECRAFT Okay. We'll see you at Botswana.

PAO This is Shuttle Control. Buckhorn has loss of signal with Columbia. Bill Lenoir has begun the 12 minute purge of his suit. Next acquisition is at Botswana in 35 minutes. By that time, Lenoir believes he should be in the airlock depressed to 9 psi and hopes to have a report on the results of some of the procedures. At 4 days, 3 hours, 38 minutes mission elapsed time. This is Shuttle Control, Houston.

END OF TAPE

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SPACECRAFT do you want that (garble) to hurry, I can pop the purge valve for a little bit.

CAPCOM Columbia, this is Houston. Bill you can use your helmet purge valve to bring it down closer to the pressure that it was regulating before, and then let's see how the, where the pressure stops when it's coming down from the top.

SPACECRAFT Okay, it's reading 4.0 right now.

CAPCOM Okay Bill, while we're waiting for this pressure to equalize here, I'd like to pass on a note to you about backing out here on your post EVA.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, the first column on page 6-2, there is a - not applicable, on the second column here, before we equalize the, before we open the interhatch equalizer valve, equalizer valve to normal. We'd like you to go on your suit, O2 actuator to IV, then interhatch equalization valve to normal. And you can follow the rest of the procedures as written. When you get through with the procedures on 6-2, go to the post EVA entry prep on page 7-2.

SPACECRAFT Okay Bob, I just now got paper and pencil, say all that again, 6-2 and go.

CAPCOM Okay 6-2, you can delete the entire first column. Under the second column there, where it says interhatch equalization valve to normal. Before you accomplish that step, take your O2 actuator to IV. In the second column, your actions will read, your first action will read, O2 actuator IV, your second action will read interhatch equalization valve to normal. Then you can continue the rest of the nominal procedures.

SPACECRAFT Starts with my O2 actuator to IV, and then interhatch normal.

CAPCOM Right, interhatch equalization valve to normal.

SPACECRAFT Roger, understand.

CAPCOM And when you get through with those procedures on page 6-2, you can go to the post EVA entry prep on page 7-2.

SPACECRAFT Okay, understand, post EVA entry preps 7-2 will be as published, is that true?

CAPCOM That's affirmative. And we got 30 seconds to LOS. Bill how's your suit doing?

SPACECRAFT Minutes for me to evaluate a mini work station, and some restraints in here as long as I'm 0-g pressurized?

CAPCOM Yeah Bill, as long as it doesn't take too long. We're going to lose you here in about 10 seconds and we'll pick you back up at Indian Ocean station in about 2 minutes.

SPACECRAFT Okay.

CAPCOM What's your suit pressure now?

SPACECRAFT 3.6 on the guage.

CAPCOM Okay, we copy.

SPACECRAFT The numbers.

PAO This is Shuttle Control, Botswana has loss of signal. About a minute away from acquisition through the Indian Ocean station. During this pass, Bill Lenoir reporting that the fan for Joe Allen's suit does not behave any better at the lower pressure than it did before, exhibits the same behavior. We'll stand by for acquisition at Indian Ocean. Lenoir now will begin equalizing the pressure in the airlock and will come out of there into the cabin. Going through some of the post EVA procedures, will get out of his suit. Indian Ocean station has locked on to Columbia, now.

CAPCOM Columbia, this is Houston, through IOS for about 9 minutes.

SPACECRAFT Roger, Bob. And prior to securing your, Joe's mini work station, I turned the foot restraints around, I'm going to get in them and tie the shark hook off here against one of the suit stands and just see how it is and move around a little.

CAPCOM Okay Bill.

SPACECRAFT Bob are you still there?

CAPCOM Yeah, we're with you for another 2 and a half minutes, Bill.

SPACECRAFT Okay Bob, I'm upside down in the foot restraints facing the interhatch, and I've evaluated what I call the shark hook as a restraint, I, by tying it off on this little handrail under the hatch. I guess it would be over it to you. And I have to confess, it works better as a central point restraint than I would have guessed. Ask the EVA guys if they can think of anything else I can look at real quick like, while I'm in here pressurized to 0-g.

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CAPCOM Okay Bill, they're on line, we'll get back to you pretty quick.

SPACECRAFT And Bob, while you're taling to them, it looks like my suit is locked up in pressure at 3.7 on both the guage and on the DCM meter.

CAPCOM Okay, we copy, 3.7. It looks like its found an average, doesn't it?

END OF TAPE

CAPCOM Okay, Bill they are on line we'll get back to you pretty quick.

SPACECRAFT And Bob while your're talking to them, it looks like my suit is locked up and (in pressure at 3.7 on both the gage and on the DCN meter.

CAPCOM Okay, we copy, 3.7. Looks like its found an average doesn't it?

SPACECRAFT Yes.

CAPCOM Columbia, this is Houston. Bill, we're fresh out of ideas down here about the subject you're doing there, if you've got some tethers with you, you might evaluate the tethers, and the velcro and the arms.

SPACECRAFT Yes, okay, that's easy though. Okay. I'll do that I've got tethers, I'll evaluate that, I also turned this foot restraint around and just evaluate access to the outer hatch.

CAPCOM Okay, and we're going LOS right now. Guam will be next at 0445.

SPACECRAFT Okay, I ought to be on the way back up by then.

PAO This is Shuttle Control. Indian Ocean station has loss of signal, next acquisition at Guam in 17 minutes. Bill Lenoir is still in the airlock, while he is there in a pressurized suit he is evaluating the foot restraints in the airlock in a mini work station in that airlock. He reported his suit seems to be regulating at an average of 3.7 so, the reduced pressure apparently has not freed up the regulator on his suit either as some had hoped. At 4 days 4 hours 29 minutes, Mission Elapsed Time, this is Shuttle Control, Houston.

PAO This is Shuttle Control, at 4 days 4 hours 44 minutes, Mission Elapsed Time. Standing by for acquisition through Guam.

CAPCOM Columbia, this is Houston with you through Guam for 5 minutes.

SPACECRAFT Okay, Houston we got Bill coming out of his suit now, and we're going to get started on other things.

CAPCOM Okay, and we've got a couple of messages onboard now, concerning those other things. We've sent you a message concerning the commanders communications configuration for entry. And also, a change list, change to the entry switch list.

SPACECRAFT Okay, thank you, we'll look for them.

CAPCOM Okay Vance, have you got anybody upstairs right now?

SPACECRAFT (garble)

CAPCOM We need some some actions here to reconfigure the ECLS system.

SPACECRAFT (garble) need there, Bob, I'll go up and do it.

CAPCOM Okay. On panel L2, we need the 02 cross over valves, 2 of them to closed.

SPACECRAFT Two cross over valves, 2 of them to close.

CAPCOM Right, and on, when you get back downstairs on M010W we need the 02 emergency to open.

SPACECRAFT M010W.

SPACECRAFT Okay, Bob, this is EV1, and I'm out of the suit and I'm getting right on with the post EVA completion here, and then the post EVA entry prep I'll get completed.

CAPCOM Okay Bill.

SPACECRAFT And Bob, that was the emergency req M010W, right?

CAPCOM That's affirm, M010W, 02 emergency, open.

SPACECRAFT Okay, that's complete.

SPACECRAFT Bob, we got the worst looking spacecraft in the world right now, we've got a lot of stowage to do.

CAPCOM Yes sir, I can imagine, we plan to leave you alone.

CAPCOM And Columbia, we do have one request from our IMU friends, some time, next time you have somebody upstairs could you give us a check on our elevon positions?

SPACECRAFT Okay, both starboards have been trailing edge up most of the day. Right now, we can't see, but we're becoming, when it gets daylight we'll take a look.

CAPCOM Okay, and if you could just give us that information over Hawaii.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, you're 30 seconds to LOS at Hawaii, or at Guam, we'll talk to you at Hawaii at 5 8.

SPACECRAFT Okay, see you then.

PAO This is Shuttle Control, Columbia is out of range at Guam, moving toward Hawaii. Should be acquired by that station in 6 minutes, 20 seconds. Bill Lenoir is out of his pressure suit now. And Bob Overmyer indicated over Guam that they had a lot of stowage to start taking care of. Crew will work on the nominal crew activity plan, which includes a certain amount of time for stowage at this time. At 4 days, 4 hours, 52 minutes, mission elapsed time, this is Shuttle Control, Houston.

PAO This is Shuttle Control at 4 days, 4 hours, 58 minutes, mission elapsed time. To repeat, the crew is back on the nominal crew activity plan for this day, which includes stowage for entry tomorrow. This mission will not be extended. And the plan is to land at the nominal time at Edwards Air Force Base tomorrow. To repeat, the crew is back on nominal timeline for an entry and landing at Edwards Air Force Base tomorrow.

PAO This is Shuttle Control, 4 days, 4 hours, 59 minutes, Hawaii has acquisition now.

CAPCOM Columbia, this is Houston with you through Hawaii for 7 and a half minutes.

SPACECRAFT Roger, and we've activated the air model right now.

CAPCOM And Columbia could you say your last mission again please?

SPACECRAFT We just activated the air model, we're in the process of stowing up.

CAPCOM Okay, pack it up neat.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead, Columbia.

SPACECRAFT Rog. How about this hydraulic thermal interaction, the hydraulic thermal test. Do you want to keep that running for a long time, when do we shut it down?

CAPCOM Columbia, this is Houston, the interaction test is complete. The RMU's got his data and he's analyzing it right now. There'll be no further action on your part regarding your configuration looks good.

SPACECRAFT In other words, leave circ pumps on?

CAPCOM We'd like the circ pumps left in GPC, Vance because we need - and the thermostat mode here while you're in no sun.

SPACECRAFT Okay, circ pumps will be left GPC, we're through, good, thanks.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead, Columbia.

SPACECRAFT Yeah. Just for ease of stowage, we're throwing a number of items, like clothing and that in the big giant trash bags, so of course they'll be removed when we get to Houston, right?

CAPCOM Yes sir, that sounds reasonable to us. We'll be careful with what we throw out.

SPACECRAFT There's no way we can fold this stuff up and get it back where it was.

CAPCOM Columbia, this is Houston, we're 1 minutes to LOS at Hawaii. Next pass will be at Botswana, so we have a long LOS here, we'll turn you over to the orbit team. This will be the last shift for the ascent/entry team today, but you've got to have the orbit team home by dark, because they're not allowed to be out when the sun is down.

SPACECRAFT (laughter) We understand that.

CAPCOM See you tomorrow for the entry.

SPACECRAFT At 6 o'clock, do you know where your orbit team operators are?

PAO This is Shuttle Control, Hawaii has loss of signal. Next station is Botswana in 41 minutes. And in the mission control center, Tom Holloway is preparing to hand over flight director responsibilities to John Cox as the team hand over

END OF TAPE

PAO Next station is Botswana in 41 minutes. Here in the Mission Control Center, Tom Holloway is preparing to hand over flight director responsibilities to John Cox as the team handover is underway, we estimate the change-of-shift news conference for 12:00 noon Central Standard Time, Room 135 in the JSC News Center. Change-of-shift news conference with Flight Director, Tom Holloway, 12:00 noon Central Standard Time in room 135, JSC News Center. At 4 days, 5 hours, 7 minutes, mission elapsed time, this is Shuttle Control, Houston.

PAO Mission Control, Houston. 4 days, 5 hours, 27 minutes mission elapsed time. Offgoing ascent/entry Team, Flight Director, Tommy Holloway, has left Mission Control Room on his way to Building 2 for the scheduled 12:00 noon press conference. Mission Control, Houston, 4 days, 5 hours, 47 minutes standing by for acquisition of signal through Botswana tracking station.

CAPCOM Columbia, Houston. The Orbit Team is standing by with you now through Botswana for 6 minutes.

SPACECRAFT Okay, Houston. We're still packing away up here.

CAPCOM Roger, Vance. We read you loud and clear.

SPACECRAFT Mike, word has it that your crew is known as the daylight crew only.

CAPCOM Yeah, it's been a real nice flight for us. We saw the entry team walking outside rubbing their eyes, wondering what that big bright thing was up in the sky.

CAPCOM And Columbia, Houston. We've got a couple of notes for you if you've got a minute to copy.

SPACECRAFT Okay, Mike. Let her rip.

CAPCOM Roger. We'd like to configure to PCS System 2 here, panel L2. We'd like the System 2 reg inlet now to close and then down on M010W, we'd like the N2 crossover valve to open. And that'll get us off the System 1 which caused the alarm last night.

SPACECRAFT Okay. Understand. But right now, you'd like to configure PCS2 and leave the N2 reg closed on System 2 up (garble) usually leave closed, and down on M010W open N2 crossover.

CAPCOM That's correct. And one additional note, before the fire smoke detector test which is scheduled at 7 plus 30 tonight, we'd like you to cycle the circuit breaker on panel 015. That's smoke detector bay 1 Bravo/3 Alpha. We'd like you

to open it, close it. That resets the trip logic. When you're performing that circuit A test, be sure and hold in for 1 minute, or until the 3 Alpha alarms come on, whichever is first.

SPACECRAFT Okay. Which breaker is that again, Mike?

CAPCOM Okay. It's on panel 015, 0 Charley. It's smoke detector bay 1 Bravo/3 Alpha.

SPACECRAFT Okay. And you want - that (garble) pulled and cycled when we do the test?

CAPCOM That's affirmative.

CAPCOM And Columbia, Houston. You can cycle that circuit breaker any time, just before you do that fire smoke detector test and we're going to go LOS for about 2 minutes and talk to you through IOS.

SPACECRAFT Got my hand on it. Can I go ahead and cycle it, Mike?

CAPCOM That's affirmative.

CAPCOM Columbia, Houston, we're with you again through IOS for 6 minutes.

SPACECRAFT Roger, Mike.

CAPCOM And Columbia, Houston. A weather message should be coming up now.

SPACECRAFT Say again, Mike.

SPACECRAFT Houston, Columbia. How do you copy?

CAPCOM Roger, Columbia. Have you loud and clear.

SPACECRAFT Okay. Did you have a message for us here? We cut you out or you cut us out or something.

END OF TAPE

SPACECRAFT Houston, Columbia, how you copy?

CAPCOM Roger, Columbia, have you loud and clear.

SPACECRAFT Okay, did you have a message for us there we cut you out, or you cut us out, or something?

CAPCOM That's negative, we haven't sent anything up, Bob, except to tell you the weather message was coming up.

SPACECRAFT Okay, we copy.

CAPCOM Columbia, Houston with a minute to go here at IOS. We're going to move up the private medical conference 1 REV, that'll be the next thing you have here at Hawaii at 6 + 33. We moved it up just to give you a better coverage there.

CAPCOM And Columbia, Houston, were 30 seconds to go to LOS, Hawaii is next at 6 + 33, with a private medical conference.

SPACECRAFT Okay, Mike, we'll see you there. The doctor.

CAPCOM Roger, and once again, we just moved that up to give you a better coverage this pass.

SPACECRAFT Okay.

PAO Mission Control, Houston, 4 days, 6 hours, 6 minutes, mission elapsed time. Columbia has passed out of range of the tracking station at Indian Ocean. Crew is primarily involved in cabin stowage, getting things cleaned up in preparation for entry day. Only have about 3 and a half hours remaining in their day before their scheduled to be asleep. This is Mission Control, Houston.

PAO Mission Control, Houston, standing by for acquisition through Guam.

PAO Mission Control, Houston, 4 days, 6 hours, 25 minutes. Not expecting any communication on this pass, barely skirting the edge of the range of the Guam tracking station, orbit number 69. Spacecraft is just about to pass into daylight, and we'll be reacquiring in about 7 minutes and 40 seconds over Hawaii, and that'll be about a 7 and a half minute pass. This is Mission Control, Houston.

PAO Mission Control, Houston at 4 days, 6 hours, 33 minutes, mission elapsed time. About to reacquire signal over Hawaii where there will be a private medical conference. Crew is back on the nominal timeline. And at this time, they are probably still going through a cabin stowage and configuration

for entry. And then are scheduled to go into their mealtime. This is Mission Control, Houston.

CAPCOM Columbia, Houston, with 4 minutes to go in this pass.

SPACECRAFT Okay, Mike, we copy.

CAPCOM And Bob, we've got some switches on panel R1, when you get a chance. We'd like to turn off cryo set 3 heaters, that's O2 tank 3 heater A to off, and H2 tank 3 heaters A and B to off.

SPACECRAFT Okay, I got it, H2 tank 3 heaters H2 both of them to off, and (garble) get on there for a second. And O2 tank 3 heaters A and B, O2 are both off.

CAPCOM That's affirmative, all the heaters on tank 3 should be off now, tank 3 is near depletion and we'd like the heaters off. We'd also, we'll pass up the supply water dump right now. We'd like to dump tank bravo to 10 percent. And this should preclude us doing a dump tomorrow morning before entry.

SPACECRAFT Okay, bravo to 10.

CAPCOM And Columbia, Houston, we'd like to get a how goes it on the stowage, if you get a chance.

SPACECRAFT Mike, I think we're pretty well under control, we got most of the stuff stowed, it's not very neat and very pretty, but we still got a good amount more to go. It's unbelievable how much stuff we had left down here from the, that confusion on the EVA and the starting and stopping on the stowing of that thing.

CAPCOM I can believe that, Bob. Let me clarify the water dump, we'd like you to go ahead and dump it to 10 percent, but do it at 8 o'clock, right on time, at 8 hours.

SPACECRAFT I understand. Mike on the stowage, if we have time in the morning, we intend to try to get Joe out of here, airlock.

CAPCOM Roger, we understand.

SPACECRAFT It's easy for you to understand.

SPACECRAFT I think he's still hoping for an EVA.

CAPCOM Roger.

END OF TAPE

SPACECRAFT Roger, we understand.

SPACECRAFT It's easy for you to understand.

SPACECRAFT I think he's still hoping for an EVA.

CAPCOM Roger.

CAPCOM And Columbia, Houston, we're 30 seconds to go till LOS, we'll see you through Santiago at 7 + 0 0.

SPACECRAFT Okay.

PAO Mission Control, Houston, 4 days, 6 hours, 41 minutes, mission elapsed time. Columbia has just passed out of range of the Hawaii station. There was a scheduled private medical conference with the crew and the flight surgeon on that pass. I think that occurred early in the pass, and we'll check on that for you shortly. Crew sounds in good spirits as they prepare their equipment, stowing everything for entry and a little good natured kidding about possibly stowing Joe Allen in the airlock. And crew should be settling in for a meal fairly shortly if they're getting caught up on their cabin stowage. 4 days, 6 hours, 42 minutes, mission elapsed time, this is Mission Control, Houston.

PAO Mission Control, Houston, 4 days, 7 hours, 0 minutes, standing by for acquisition of signal through the Santiago tracking station.

CAPCOM Columbia, Houston with you through Santiago for 5 minutes, over.

SPACECRAFT Okay, Mike, we copy.

SPACECRAFT Houston, Columbia, how do you read?

CAPCOM Roger, Bob got you loud and clear.

SPACECRAFT We got the CDRs down exercising for tomorrow morning and that's what you probably heard there.

CAPCOM Okay, we copy.

SPACECRAFT Hey, Michael, a quick reference check, (garble) with FAC and tell me when the crystal growth experiments can be turned off.

CAPCOM Roger, Joe, that's supposed to continue to run all throughout flight, it won't be turned on until after landing, turned off

SPACECRAFT And Mike, you might make a note, it looks like the PLTs WCCU number bravo, that's bravo has gone south on us. It was really getting scratchy and bad, and we changed out the batteries. I haven't done any more on that, it probably ought to be just looked at when you get back.

CAPCOM Okay, we copy Bob, the wireless unit bravo, is down, and you did change the batteries on it.

SPACECRAFT Yeah, and I'm on the evening and tomorrow morning.

CAPCOM Okay, you cut out there, what are you on right now, Bob?

SPACECRAFT I'm on the hardline HIU sitting in the PLTs seat, and I'll just kind of use the hardline all the rest evening until bedtime.

CAPCOM Understand.

SPACECRAFT And thanks for the other info Mike, I was afraid I, perhaps missed it. And although now I do remember, it's not to be turned off.

CAPCOM Roger, Joe.

CAPCOM And Columbia, Houston with 45 seconds to go here at Santiago, and if you guys concur, we'd like to go ahead and plan to do the tag up here at Indian Ocean coming up at 7 + 31, get that out of the way and leave you alone tonight.

SPACECRAFT Okay, that sounds fine, Michael.

CAPCOM Roger.

CAPCOM Columbia, Houston with you through IOS for 6 and a half minutes, over.

SPACECRAFT Okay Mike, you're coming in loud and clear, how do you read?

CAPCOM Okay, I've got you loud and clear, and we can start our tag up at your convenience.

SPACECRAFT Stand by 1. Okay, why don't you go ahead.

CAPCOM Roger, the data from the LVLH test we did this morning looks real good. You'll be happy to know that the SBS has been despun, and the reflector antenna was

END OF TAPE

SPACECRAFT Okay, why don't you go ahead.

CAPCOM Roger, the data from the LVLH test we did this morning looks real good. You'll be happy to know that the SBS has been despun and the reflector antenna was raised, they started lowering the solar arrays this time. We got some good engineering data about the, from Bill on his test there with the EMU fan and reg problems this morning. That was a good exercise for us. The event timer, mission timer problems you saw in the aft deck there, we think is probably a transformer problem right now. And of course we have the pilots wireless fail, wireless bravo is down, are the anomalies we've had today. As far as tomorrow, we plan to do a nominal deorbit and landing. The deorbit TIG right now is 5 days, 1 hour, and 17 minutes. Landing about 5 days, 2 hours, and 15 minutes, on Edwards 22. It'll be about sunrise plus 7 minutes. Weather is good at all the CONAS sites, for tomorrow and the next day. You can expect the weather at Edwards tomorrow to be about 16 thousand scattered and 25 thousand broken, with 7 miles plus visibility. Winds about 240 at 8 knots, pretty much down the runway, and the temperature is about 40 degrees, so wear your long underwear. The sleep configuration, we've got, we'd like to get an elevon position report from you next time you're in daylight and we're talking to you if we could. We've got a list of caution/warning channels we'd like to change the limits on, if you've got a chance to copy.

SPACECRAFT Go ahead.

CAPCOM Okay, these are the ones we changed for the EVA, and we'd like to reset them now, if you've got a pencil and paper. Again this is on panel R13, caution/warning channels. We'd like channels 14 and 54 to go ahead and enable those channels and verify that the upper limit is 4.9 volts, on channel 4, we'd like to reset the upper limit to 3.8 volts, on channel 24, we'd like to verify channel's 24 and 64, we'd like to verify the upper limit at 4.9 volts, and channels 34 and 44, we'd like to reset the upper limit to 3.6 volts, over.

SPACECRAFT Okay, count 1, 4 and 5 for enable, and (garble) 0 4.9 0 volt, channel 4, 3.80 volts, channel 24, channel 64, 4.9 volts and make sure they're enabled, channel 34 and 44, 3.6 volts, over.

CAPCOM Roger, that's a good read back. State vector, good message, will be coming up tonight if we don't give you a good, a go before that. The only other thing we have right now is if you want to leave Joe in the airlock, your exchange crew has agreed to let him out after landing tomorrow, and we're taking names for burrito run right now, if you guys want one.

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SPACECRAFT Boy that sure sounds good, that would just about top it all off, I tell you.

SPACECRAFT Hey, Mike, Yes I'll order a jalapeno burrito and a beer.

CAPCOM Roger, we'll send the beer.

CAPCOM: Go ahead.

SPACECRAFT We think Bill's feeling a little better.

SPACECRAFT Make that 4 beers.

CAPCOM Roger, we got that, jalapenos and a beer on order.

SPACECRAFT And 4 beers for me too.

CAPCOM Roger.

SPACECRAFT Remember though, that's only 1 jalapeno.

CAPCOM Roger.

SPACECRAFT Okay, I think we're pretty well squared away for the evening, now, Mike. So we'll be ready to get up in the morning and charge.

CAPCOM Okay, we'll continue checking in with you here for a few more sites. Sleep period starts at 9 + 30 tonight, so we'll check in with you for another hour and a half here or so. But we don't have a lot for you right now.

SPACECRAFT Alright, and we'll be looking for elevon position.

CAPCOM Roger, that.

SPACECRAFT And Mike, the C&W limits are set.

CAPCOM Okay, thank you, Bill.

END OF TAPE

CAPCOM And Columbia, Houston. We're 30 seconds from LOS and we'll talk to you through Guam at 8 plus 00.

SPACECRAFT Okay. See you then.

PAO Mission Control, Houston. 4 days, 7 hours, 39 minutes mission elapsed time. Just passing out of range of the tracking station at Indian Ocean, orbit number 70. The ground controllers here at Mission Control passing up information to the crew to help them get the spacecraft ready for the night, setting new limits on the caution and warning system which activates audible alarms to the crew should any temperatures and that sort of thing get out of limits. Generally, they set those at a fairly wide margin during the evening, still within what they feel will tell them what they need to know but to avoid waking the crew unnecessarily. We're about an hour and 50 minutes away from the scheduled crew sleep period and Commander Vance Brand commented that the crew is pretty well squared away for the evening and they will be ready to get up and charge in the morning as they get ready for entry. We're about 20 minutes away from the next opportunity to communicate with the crew aboard Columbia. That'll be a very low elevation pass over just the edge of the Guam tracking station and then we'll just barely clip the edge of the range for the Hawaii station before making a fairly good pass across Santiago and Ascension. That'll be about the last opportunity to, one of the last opportunities to speak to the crew before bedtime. At 4 days, 7 hours, 40 minutes mission elapsed time. This is Mission Control, Houston.

CAPCOM Columbia, Houston with you through Guam for 3 minutes. Over.

SPACECRAFT Houston, Columbia. Loud and clear.

CAPCOM Roger. Got you loud and clear.

SPACECRAFT Roger, Mike, and if you see on the tape an inadverted flack wing on CRT power, it was inadvertant, it was not intentionable.

CAPCOM Okay. Caught that. Thank you.

SPACECRAFT Mike, I've got the IMU align data if you need it?

CAPCOM Okay. Stand by a second.

CAPCOM And Columbia, Houston, we're standing by for the IMU align data.

SPACECRAFT Okay. Star 45 and 21, angular air 0.01, delta X's were plus 0.09, minus 0.05, plus 0.07. Delta Y was minus 0.04, plus 0.01, minus 0.19. Delta Z minus 0.15, plus 0.11, minus 0.23. We executed at 04, 07, 42, 30. Over.

CAPCOM Okay. We got all of those numbers, Bob. Thank you very much.

SPACECRAFT (garble) Mike, we're looking at the elevons, we're just having a sunrise here. On the left wing, the outboard is down and out of sight, presumed to be probably about full down. The left inboard looks full up and on the right wing, they both look to be full up.

CAPCOM Okay. We copy all that. Thank you.

CAPCOM And Columbia, Houston, wonder if you've got a time for us on the ASE temp check?

SPACECRAFT ASE temperature?

SPACECRAFT Okay, Mike. Say again. We thought you cancelled that one.

SPACECRAFT Mike, we thought that on the message it said that we didn't need to do that.

CAPCOM Okay. We'll get back to you on that one here. We're 30 seconds to LOS and we'll check in with you again at Hawaii at 8 plus 10.

SPACECRAFT (garble).

PAO Mission Control, Houston. Columbia has passed out of range of the tracking station at Guam at the present time. Crew reported some figures of the results of the inertial measurement unit alignment that they performed. Part of the navigation aids onboard the space shuttle. They reported the position of the elevons, those...

END OF TAPE

PAO Crew reported some figures as the results of a inertial measurement unit, alignment that they performed part of the navigation aides onboard the space shuttle. They reported the position of the elevons, those are the aero surfaces on the wing. We are on orbit number 70 at the present time, and will be reacquiring in about 7 and 1/2 minutes over Hawaii for a short period of time. 4 days 8 hours 3 minutes Mission Elapsed Time, this is Mission Control Houston.

PAO Mission Control Houston standing by through Hawaii.

CAPCOM Columbia, Houston with you over Hawaii for 3 minutes, over.

SPACECRAFT Roger Mike, and I don't think you guys should be too concerned, we started the fuel cell purge right here at the Hawaii pass, instead of waiting another 20 minutes if that's alright with you.

CAPCOM Roger, that's fine with us Bob, thank you.

SPACECRAFT And also Mike, on the pam ASE thermal test don't bother with an answer, ANIK is almost done now and SPS was completed, started at 8:03.

CAPCOM Roger, we sure appreciate that, it was deleted originally because of the EVA plans today. We'd like to get the star trackers in track if you have a chance please.

SPACECRAFT Okay, (garble).

SPACECRAFT Okay Mike, ANIK test is complete.

CAPCOM Roger, we see that, thank you.

CAPCOM And Columbia, Houston, we're 30 seconds from LOS, we'll check in with you at Santiago at 8 plus 36.

SPACECRAFT Okay, see you there.

PAO Mission Control Houston, 4 days 8 hours 14 minutes, Mission Elapsed Time. Columbia's passed out of range of the tracking station at Hawaii. Crew reporting that they're conducting the temperature checks of the airborne support equipment which remains in the payload bay after the deployment of the satellites. That equipment consisting primary of the cradle and the other structural support equipment remains and trying to gather some data on that as to how that performed. Commander Bob Overmyer reported that the fuel cell purge was underway a little bit early. They purge those fuel cells about every 12 hours, to keep them fully operational. We'll be out of

communications for about another twenty minutes here, till we reacquire over Santiago Chile. This is Mission Control at 4 days 8 hours 15 minutes, Mission Elapsed Time.

PAO Mission Control Houston, 4 days 8 hours 35 minutes, Mission Elapsed Time, standing by to reacquire communication with Columbia over Santiago Chile. Less than an hour remaining in the scheduled crew awake period.

CAPCOM Columbia, Houston with you through Santiago for 5 and 1/2 minutes, over.

SPACECRAFT Okay Houston, we hear you loud and clear.

CAPCOM Roger Vance, got you loud and clear, and a reminder you need to break interconnect before sleep tonight.

SPACECRAFT Say that one again please.

CAPCOM Roger.

SPACECRAFT It's already done, Mike.

CAPCOM Roger, we copy.

CAPCOM And Columbia, Houston, our data still shows your interconnect at the left OMS, could you check that one please?

SPACECRAFT We did that one switch out, but we were off, we've been off the RCS system for quite awhile here Mike.

CAPCOM Okay, copy Bob, thank you.

SPACECRAFT We had come off the interconnect and then stopped the item 5, but we had closed the cross feed on the RCS so we missed the OMS cross feed here.

CAPCOM And Columbia, Houston, I'd like to remind you about the lithium hydroxide cannister changeout, we show the PPU CO2 is still going up a little bit.

SPACECRAFT Rog, we've got some activity going on in the middeck, that's in the way right now. And as soon as that is finished, we'll get the hydroxide changeout.

END OF TAPE

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SPACECRAFT (garble) and stopped the Item 5 that we had and we closed the crossfeeds on the (garble).

CAPCOM And Columbia, Houston, like to remind you about the lithium hydroxide cannister changeout. We show the PPU CO2 is still going up a little bit.

SPACECRAFT Rog. We got some activity going on in the middeck that's in the way right now and as soon as that's finished, we'll get the hydroxide changeout.

CAPCOM Understand.

SPACECRAFT I'm looking at the snow covered Andes there, Mike. Nice and clear today.

CAPCOM Roger. I bet that's a beautiful site.

SPACECRAFT Yeah. I'm just sorry that we've gotta - not going to see it tomorrow.

CAPCOM Columbia, Houston. When you get a chance, we'd like you to go ahead and repress the left oms using the B reg's please.

SPACECRAFT Okay. It's in work. Okay, Mike. The repress is done on the oms.

CAPCOM Roger. We see that, Bob. Thank you.

CAPCOM And Columbia, Houston, we're 30 seconds from LOS. We'll talk to you one more time through Ascension at 8 plus 50.

SPACECRAFT Okay, Michael.

PAO Mission Control, Houston. 4 days, 8 hours, 41 minutes mission elapsed time. Columbia out of range of the Santiago Chile tracking station. We'll reacquire in about 8-1/2 minutes over Ascension. We're on the last quarter of orbit number 70. Crew is continuing to go through the housekeeping duties to prepare the spacecraft this evening so that they'll be ready to go in the morning for entry preparations. Crew was reminded to change out the lithium hydroxide cannisters which help purify the breathing air in the cabin and they stated that they would get to that as soon as they got some other middeck activity out of the way. Repressurize the orbital maneuvering system tanks. We have about 47 minutes left in the scheduled crew wake time. We're planning to talk to them just one more time over Ascension Island and the next pass will be over Guam after that at which point we'll be into the scheduled crew sleep

time. They may still be awake if they've got a lot of things to do but ground control pretty much prefers to leave them alone and let them finish any activities they have and get any sleep once we get into that time. 4 days, 8 hours, 43 minutes mission elapsed time. This is Mission Control, Houston.

PAO Mission Control, Houston. 4 days, 8 hours, 49 minutes mission elapsed time. Standing by for acquisition of signal through Ascension Island.

CAPCOM Columbia, Houston with you through Ascension for 7 minutes. Over.

SPACECRAFT Roger, Mike.

CAPCOM And Columbia, Houston. If somebody's up on the flight deck, we'd like to get the left oms crossfeed B valve in GPC position please.

SPACECRAFT Okay. There it is.

CAPCOM And Columbia, Houston. If you've got a minute, we'd like to hear the results of that fire smoke detection test.

SPACECRAFT Everything worked, Mike.

CAPCOM Okay. I understand that light 3 also worked then too.

SPACECRAFT That's right, Mike. We were looking for that one to be out, but it wasn't.

CAPCOM Okay. Thank you.

SPACECRAFT And Mike, the dump is complete.

CAPCOM Roger. We copy.

SPACECRAFT You know Mike, they really ought to think about washing these flight suits pretty well before they fly them or else getting a different kind of velcro because we're getting blue pieces of lint all over all the instruments and it looks just like the blue of these flight suits.

CAPCOM Okay, Bob. That's a good comment. Thank you.

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CAPCOM And Columbia, Houston with a minute to go. This
our last site tonight. We'd like to let you alone for the rest
of the night and let you get some sleep for tomorrow. Speaking
for the Orbit Team, we're sure proud of the job you guys have
been doing up there. It's a good flight when the worst thing you
have to worry about is some missing coffee and a missing
sponge. We're sorry about the EVA...

END OF TAPE

CAPCOM proud of the job you guys have been doing up there. It's a good flight, when the worst thing you have to worry about is the missing coffee and a missing sponge. We're sorry about the EVA problems today, but you sure had an excellent flight, except for that. So you have a good entry and landing tomorrow, we'll be looking forward to seeing you.

SPACECRAFT Guess what, Mike? We're looking forward to seeing you too. And we appreciate all the fine support you guys have been giving us, all the humor and everything too. And Mike from our point of view in the payload side here, we literally couldn't have done it without your help, we appreciate it.

CAPCOM Royer, you know our motto, we deliver.

SPACECRAFT Right.

CAPCOM And Columbia, Houston, we're going LOS at this time, you guys have a good night's sleep and a good landing tomorrow.

SPACECRAFT Thank you Michael.

PAO Mission Control, Houston, 4 days, 8 hours, 57 minutes, mission elapsed time. Columbia out of range at the tracking station at Ascension now, starting on orbit number 71 in a few minutes. We've got about a 35 minute time when we won't be getting data from the spacecraft here, as it'll be about that length of time before we pass over the next station. The alt-orbit team is bidding the crew good night and congratulations on a successful mission, as this will be their last opportunity, unless there's some overriding reason to contact them again during the night to speak to them before landing tomorrow before they get back here to Houston tomorrow afternoon. Crew is still buttoning up things in the cabin and configuring the switches in the system for the night. They're due to be settling in in about 30 minutes. Sounded pretty busy, so they could be a few minutes late doing that. At 4 days, 8 hours, 58 minutes, mission elapsed time, this is Mission Control, Houston.

PAO Mission Control, Houston, 4 days, 9 hours, 40 minutes, mission elapsed time. Columbia is out of range of the tracking station at Guam on orbit number 71. DPS position here reports that crew has their CRTs in the sleep configuration, which means they're finished making the inputs into the computers tonight. So we're anticipating that they'll be able to get a good night's sleep which by the way, ends at 11:30 p.m., central standard time tonight. They'll be getting up the time a lot of people will be going to bed. They're looking for an entry tomorrow, according to the previously scheduled timeline with deorbit ignition occurring about 5 days, 1 hour, 17 minutes, mission elapsed time, landing at 5 days, 2 hours, 14 minutes, 45

seconds, approximately. During a recent pass over the Guam station, the data coming down from the spacecraft shows the cabin pressure to be a normal sea level pressure, 14.7 pounds. Cabin temperature 82 degrees fahrenheit, relative humidity 28 percent, so the crew should be fairly comfortable in their shirt sleeve environment. Be about another 30 minutes before we pass over the next station, and see any more data. The orbit team will be going off console in about an hour and a half. 4 days, 9 hours, 42 minutes, mission elapsed time, this is Mission Control, Houston.

PAO Shuttle Mission Control, Columbia on its 72nd orbit of the Earth, presently over Northern Thailand, just across the terminator from darkness into daylight. Flight director Gary Cowen and the planning team of flight controllers have arrived in the control center and are tagging up with the off going flight control team, and preparing for that handover. The orbit team flight director, Dr. John Cox will be relinquishing control of the flight shortly, and we expect his change of shift briefing to occur on time at 6:00 p.m. central time in the

END OF TAPE

PAO Orbit team Flight Director Dr. Jon Cox will be relinquishing control of the flight shortly. And we expect his change of shift briefing to occur on time at 6 pm Central Time in the building 2 newscenter at Johnson Space Center in Houston. Systems onboard Columbia continue to perform nominally. Crew is demonstrating a restful sleep period, now an hour and a 1/2 into that sleep period at mission elapsed time 4 days, 11 hours. This is Shuttle Mission Control. This is Shuttle Mission Control, flight controllers are now reviewing data being downlinked to the Mission Control Center thru Dakar. Receiving verifications that all systems on the vehicle continue to be healthy. Columbia on orbit number 73. Crew has 5 1/2 hours remaining in its sleep period, everything is quiet onboard the vehicle. Mission elapsed time is 4 days, 12 hours, 6 minutes, this is Shuttle Mission Control. This is Mission Control Houston. Columbia on orbit number 74, just passed over the ground station at Dakar and the flight controllers had a good look at the downlink data, verified that conditions onboard the vehicle continue to be, continue to be nominal. Crew is spending an apparently quiet night uninterrupted by the caution and warning alarms onboard the ship. 3 1/2 hours remaining in their sleep period. Mission elapsed time is presently 4 days, 14 hours 6 minutes, this is Shuttle Mission Control. This is Mission Control Houston. Columbia on its 75th orbit of the Earth, just over South America presently coming up in about 10 minutes on acquisition of signal thru Dakar were we'll get downlink data for the first time in about an hour since we last were in contact with the vehicle thru the rather long LOS period. 2 1/2 hours remaining in the sleep period for the crew. They'll wake up about midnight, Central Time. And assuming the nominal entry preparation and nominal entry burn tomorrow, the Columbia astronauts will be ...

END OF TAPE

PAO ...Central Time, and assuming a nominal entry preparation and nominal entry burn tomorrow the Columbia astronauts will be back on the surface of this planet in about 11 hours from now. We will have data from Dakar in about 10 minutes and at that time we'll report the status of the vehicle as interpreted by the flight control team here in the Mission Control Center, mission elapsed time now 4 days 15 hours 3 minutes this is Shuttle Mission Control.

PAO This is Shuttle Mission Control mission elapsed time 4 days 15 hours 15 minutes. Columbia within range of the Dakar tracking station. Flight Director Gary Coen instructions to all the flight controllers to review data, give him indication that systems onboard are continuing to operate nominally. Those reports are now coming in on the heater and well - being of the vehicle has been changed 2 hours 15 minutes remaining in the astronauts sleep period. We've got a report on landing conditions at runway 22 at Edwards, expect a temperature of 40 degrees around landing time. Sunrise at Edwards will occur at 6:27 a.m., touchdown of Columbia is anticipated at 6:34 a.m. Expecting surface winds of 8 knots, headwinds, the forecast winds are 40 knots at 60 thousand feet, 65 knots at 50 thousand, 100 knots at 40 thousand, 65 knots at 30 thousand feet, 35 knots at 20 thousand feet, 10 knots at 7 thousand feet. Landing constraints fall well within those parameters, maximum allowable headwinds are 25 knots, other landing constraints are 50% cloud cover, no precipitation, visibility of at least 7 nautical miles, maximum of 25 knot headwinds, as I mentioned earlier, maximum of 10 knots tailwinds, maximum 10 knots crosswinds. And we appear to be well within all of those landing constraints. All the Flight Controllers have gone to green, indicating to the Flight Director Gary Coen that no problems onboard the vehicle. The crew continues its sleep uninterrupted. Mission elapsed time 4 days 15 hours 17 minutes, this is Shuttle Mission Control.

PAO This is Shuttle Mission Control mission elapsed time 4 days 15 hours 27 minutes even, the INCO has reported to the Flight Director that the downlink data he was looking at indicated that there was the noise through the UHF system onboard Columbia which awakened the crew, apparently some spurious signal picked up by the UHF receiver onboard the ship and that was strong enough to break squelch sounded for about a minute before one of the crewmember's woke up and turned off the UHF system, or at least adjusted squelch to filter out that noise and indications are that that occurred at 12:37 mission elapsed time. Apparently beyond that the crew has slept uninterrupted and the systems onboard the vehicle are in good condition no indication what the source was of that UHF ...

END OF TAPE

PAO currently beyond that the crew has slept uninterrupted. And the systems onboard the vehicle are in good condition. No indication what the source was in that UHF transmission apart from the speculation that it was just some spurious signal. Present mission elapsed time 4 days 12 hours 28 minutes this is Shuttle Mission Control. This is Mission Control Houston. Coming up on acquisition of signal through Bermuda in a few moments. Give the flight control team another look at some downlink data from Columbia. About 50 minutes left in the sleep period for the astronauts and Flight Director, Gary Coen, and the planning team of flight controllers have through the night been going over the activity plan and verifying procedures and assuring they've got the proper sequence of events for the crew to have Columbia in it's proper flight configuration for entry activities tomorrow morning. And we'll stand by to look at data through Bermuda in just a few moments. Mission elapsed time is now 4 days 16 hours 39 minutes this is Shuttle Mission Control. Shuttle Mission Control. Flight control team is now processing data from Bermuda and Flight Director, Gary Coen, has instructed the flight control team to advise him of the status of the vehicle and to report any changes. Those reports coming in now indicate Columbia systems continue to be healthy and functioning nominally. We've lost signal through Bermuda now and flight control teams report no (garble) events onboard the vehicle. The crew rest continues apparently uninterrupted. The UHF receiver onboard which produced that spurious signal a few hours ago still is turned off. Be in fairly constant contact with the vehicle over the next several REVS as it passes over ground stations. Columbia now on its 76th orbit of the Earth. 6 more revolutions before landing at Edwards Air Force Base California. Mission elapsed time is 4 days 16 hours 47 minutes. This is Shuttle Mission Control. This is Shuttle Mission Control. Wake up period is expired and Columbia's over ground station at Yarragadee where we might have voice contact. The Mission Control team probably will not initiate that contact. And in fact, we'll probably wait until we get over Orroral to get a look at the data and see if the crew has got the UHF receiver turned back on again which would indicate that they are up and around and which would then at which point the Mission Control team will initiate wake up action.

END OF TAPE

PAO ...up and around which would then at which point the Mission Control team will initiate wake-up action. Mission elapsed time 4 days, 17 hours, 30 minutes. Standing by for the first discussions of the day on orbit 77, this is Shuttle Mission Control. This is Shuttle Mission Control, we're just about 20 seconds away from acquiring signal thru Orroral at which time the INCO will get a look at whether or not the UHF receivers have been turned back on by the crew, and at which time we may have action by the flight control team to initiate a wake-up call. Mission elapsed time 4 days, 17 hours, 35 minutes. This is Shuttle Mission Control.

CAPCOM Wake-up music ("Country Road" by John Denver).

CAPCOM Good morning, Columbia! Houston. Time to get up and brush your teeth and take a shower, we want you to come back home today.

SPACECRAFT Good morning, Jon. Hey, who selected the music this morning?

CAPCOM I'll give you three guesses and the first two don't count.

SPACECRAFT Okay, well very good. Hey, we're starting to get up and stir around here. We got your message on the teleprinter and we're looking it over.

CAPCOM Okay, fine. You should have all, and I think we sent you three messages this morning. They all should be onboard.

SPACECRAFT Alright, I think they are.

END OF TAPE

SPACECRAFT ...We got your message on the teleprinter, we're looking it over.

CAPCOM Okay fine, you should have all, I think we sent you three messages this morning and they all should be onboard.

SPACECRAFT Right, I think they are.

CAPCOM We've got about 30 seconds to LOS here, we'll see you up at Mila at 18 11.

SPACECRAFT Okay, see you over Mila.

CAPCOM And counting the message we just sent you, you should have 4 onboard, we just sent you an update to the weather.

SPACECRAFT Okay. And that was good music this morning.

CAPCOM Thank you, we'll see you in about 30 minutes.

PAO Shuttle Mission Control the Columbia Commander Vance Brand acknowledging the wakeup call, flippantly asking who was responsible for the selection of that music then, several levels of significants in the wakeup music this morning, of the obvious, reference to coming home, additionally the CAPCOM Jon McBride, is a native of West Virginia and Flight Director of the Planning Team Gary Coen was born in West Virginia, so we suspect when Vance Brand asked who selected the wakeup music he probably already knew. Columbia on it's 77th orbit of the Earth, we've lost signal through Orroral, require in half an hour through Mila. At mission elapsed time, 4 days 17 hours 41 minutes this is Shuttle Mission Control. Shuttle Mission Control we have contact with the vehicle through Mila at mission elapsed time 4 days 18 hours 11 minutes.

CAPCOM Hello Columbia, we're with you for about 11 minutes through Mila and Bermuda.

SPACECRAFT Roger Jon. And the team of Overmyer and Lenoir just did an IFM this morning, we finally had our water dispenser fail, it's been getting a little uncertain the last day or so and it failed this morning both in the powered mode and in the bypass mode, so the bypass was bypassed, yes and we're using, the head on the utility water hose to fill water bags and stuff.

CAPCOM Okay we copy that and in relationship to water, you can tell Bob that there's no H2O dump this morning.

SPACECRAFT No H2O dump this morning. And Bob or Bill might fill you in more on this IFM thing.

Yes Jon, there's a hose that's intended to use,

just as we're using it, the problem is that it's got a nipple on it that's too long and it wouldn't fit off the side of the water dispenser package. So we had to remove the water dispenser package to get it on and then loosely reinsert it. It's on tight now.

CAPCOM Okay, we copy that and we'll look it over for you.

SPACECRAFT Okay Jon, what we're doing is coming out of the side port which was connected to the 12-foot water hose, and that hose had a 90 degree elbow on it because it appears to get the spacecraft wall but the spare hoses in the IFM kit did not have the 90, so we had to loosen the water dispenser to be able to get the, keep the (garble) between the wall and the hose.

CAPCOM Okay we copy all that, but as of right now everything is operational, you can get water?

SPACECRAFT We're, it's operational, we can get all the water we want now Jon.

CAPCOM Okay that sounds good.

SPACECRAFT Houston, Columbia, are you done with the teleprinter so I can break that apart for this COMM reconfiguration?

CAPCOM No, we'd like for you to hold off on that awhile, we may have one more message to send up a little later.

SPACECRAFT Okay I'll hold off until you tell me you're finished.

PAO Shuttle Mission ...

SPACECRAFT ...Columbia.

CAPCOM Go ahead.

SPACECRAFT Jon are the PAPPI's good on 22 now or are they still under water?

CAPCOM As of this morning the PAPPI's are GO on both ends of the runway.

SPACECRAFT Please repeat?

END OF TAPE

CAPCOM Go ahead.

SPACECRAFT Jon, are the PAPI's good on 22 know or are they still underwater?

CAPCOM As of this morning the PAPI's are go on both ends of the runway.

SPACECRAFT Please repeat.

CAPCOM The PAPI's are operational on both ends of the runway at Edwards.

SPACECRAFT Okay.

CAPCOM And Vance, regarding that CTR message, we're working on your PTI entry message that's what that will be.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control. Vance Brand acknowledged the wake-up, the initial contact during this pass and that was Bill Lenoir discussing the difficulty with the water dispenser which provides potable water to the crew and of course helps them rehydrate....

CAPCOM Columbia, Houston. We would like would like for you to get your startrackers in a track mode any time now.

SPACECRAFT Okay, by the way they passed the startracker test with flying colors this morning.

CAPCOM That's good news.

PAO This is Shuttle Mission Control, the PAPI's that Mission Commander Vance Brand was inquiring about are the high intensity lights that have been installed at both ends of runway 22 at Edwards to, as reckoning aides, to help the crew line-up. And CAPCOM Jon McBride confirmed that the PAPI's were in position at both ends of runway 22. About 3 1/2 minutes remaining in this pass, presently acquiring signal thru Bermuda.

CAPCOM And Vance, we're about a minute to LOS here at Bermuda. See you over Dakar at about 18 27. GNC's would like to see some startracker data if possible.

SPACECRAFT Tell them to standby Jon, Vance is off COMM right now, say that again.

CAPCOM We're about 30 seconds to LOS here at Bermuda, see you at Dakar in about 5 minutes and GNC's anxious to see some startracker data.

SPACECRAFT Okay, AOS Dakar in 5 minutes, and you want to see startracker data.

CAPCOM That's affirm, would like to get them into track mode.

SPACECRAFT I understand.

PAO This is Shuttle Mission Control. We have loss of signal thru Bermuda, reacquire at Dakar in 4 minutes. Flight Director Tommy Holloway and his team have arrived in the Mission Control Center and are tagging up with the off-going flight team. Tommy Holloway will be the first Flight Director of the Shuttle here to both, to preside over both the launch and landing of a Shuttle vehicle. And as a reminder the press conference with off going Flight Director Gary Coen has been cancelled in the absence of any requests to pursue that.

CAPCOM And Columbia, we're back with you for 5 minutes thru Dakar.

SPACECRAFT Okay, Jon. Jon, we got the startracker tracking for you.

CAPCOM Thank you very much.

CAPCOM And Bob, we've got about a minute here to LOS, we'll see you over Indian Ocean at 18 45.

SPACECRAFT Okay, Jon.

(garble)

Intercom check, go ahead.

Got your copy from Houston, configuration Lima.

What's the remarks that go with that?

Air to ground 1 and teleprinter.

Crew status still awake?

That's affirm, awake.

Roger. (garble).

Houston COMTEC (garble) air to ground 1.

END OF TAPE

air to ground 1 and teleprinter. 3 status still
awake.

COMTEC That's affirm. Awake.

Roger.

COMTEC Houston, COMTEC Sunnyvale complex, air to ground
1. Air to ground 1.

This is Houston, COMTEC, go ahead, Sunnyvale.

COMTEC Roger, just want to verify. You want S-band air
to ground on the air to ground 1 and teleprinter on air to ground
2?

That's affirmative.

COMTEC Roger, out. Thank you.

PAO Shuttle Mission Control. Mission elapsed time 4
days 18 hours 45 minutes. Standing by for voice contact
momentarily through Indian Ocean.

CAPCOM Columbia, Houston, we're back with you for a long
8 minutes here at IOS.

SPACECRAFT Okay, Houston, IOS for 8 minutes.

CAPCOM And Columbia, we're going to uplink your entry
summary here at Indian Ocean. Like for you to take a good look
at that. See if you've got any questions.

SPACECRAFT Okay, Jon, understand you're going to send us up a
summary?

CAPCOM That's affirmative. Your entry summary.

SPACECRAFT The entry summary.

CAPCOM And Columbia, Houston, if you'll verify for us
that you have messages 48 and 49 onboard. We'll give you the go
ahead to tear down the TPR. And Columbia, Houston, how do you
read?

SPACECRAFT Okay, Jon, loud and clear, go ahead.

CAPCOM Okay, if you'll verify that you have teleprinter
messages number 48 and 49 onboard we'll go ahead and give you the
go to disconnect the teleprinter and start your COMM
reconfiguration.

SPACECRAFT Standby Jon, we're still trying to assist.

CAPCOM Okay, standing by, we got about a minute and a half to LOS.

SPACECRAFT Okay, understand. If we do have 48 and 49 we're cleared to tear it down.

CAPCOM Yes, not literally though.

SPACECRAFT Figuratively. Just don't give Lenoir or Overmyer any of those wrenches or we'll tear it down.

Where do we keep the hammer?

CAPCOM Yes, we just want to let you know that 49 was the planning team's parting shot and if you've got 48 we're happy.

SPACECRAFT Okay, Jon, we can verify that too, thank you. We like them.

CAPCOM And we're about 35 seconds to LOS. We'll see you over Yarragadee at 19 01.

SPACECRAFT Outstanding message Jon. Much obliged.

CAPCOM Yes, we concur with that. And that's the way we felt about the whole mission for you guys.

SPACECRAFT Jon, you're very scratchy on this pass. It's probably us but we're hardly reading you right now.

CAPCOM Okay, we're LOS, we'll see you Yarragadee in about 6 minutes.

SPACECRAFT Okay, see you at Yarragadee.

PAO Shuttle Mission Control. Last teleprinter message that they were discussing that Joe Allen remarked enthusiastically about was a simple mark message typed large block letters spelling out "we deliver" which was the last teleprinter message that the crew will receive on STS-5 assuming nominal entry. And CAPCOM explaining the parting shot from the planning team of flight controllers. Will reacquire signal again in about 6 minutes through Yarragadee. Mission elapsed time is 4 days 18 hours 55 minutes. This is Shuttle Mission Control.

END OF TAPE

PAO ...planning team of flight controllers, will reacquire signal again in about 6 minutes thru Yarragadee. Mission elapsed time is 4 days, 18 hours, 55 minutes. This is Shuttle Mission Control.

CAPCOM Columbia, we're back with you at Yarragadee for about 8 minutes.

SPACECRAFT Okay, Jon. We just got an alignment and we're proceeding to tail sun attitude.

CAPCOM Okay, we copy that.

SPACECRAFT Just out of curiosity, what was the purpose in going to inert this star align attitude on normal jets. Was it to warm them up or something?

CAPCOM We're checking for you Vance.

SPACECRAFT Okay.

CAPCOM Yes Vance. We wanted to use the normals to stop the PTC a little quicker and save a little gas.

SPACECRAFT I see. Okay I understand.

CAPCOM I guess the real reason is we didn't want to fire the vernier jets as long as it would have fired them.

SPACECRAFT Yes, it's clear now. It looked like. Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT Got a beautiful view of the west coast of Australia right now. It's a lot clearer today than it has been so a great opportunity to use the eyeballs.

CAPCOM Yes, we all envy you, and wish we were there to see some of that too.

SPACECRAFT Just a matter of time, I'll bet.

CAPCOM Hope so.

SPACECRAFT Jon, that's a standard CAPCOM comment over the ages.

CAPCOM Yes, I think we realize that, too.

SPACECRAFT I know I made that comment myself, and I know Joe has, and I know Bill has and I feel certain that Vance has

sometime or other.

CAPCOM Yeah, and I bet if I put Dick Covey on the line, he'd say the same thing, too.

SPACECRAFT Okay, take a look at your map down there, what city did we just go over? Was that Perth down there?

CAPCOM We believe that to be Perth, we're double checking.

SPACECRAFT It's right on the coast, beautiful, just clear, they're having a beautiful day down there today.

CAPCOM Yeah, that's the great town of Perth.

SPACECRAFT And did you confirm that was Perth?

CAPCOM Yes sir. We can affirm that that is Perth. And Columbia, we're going to lose you here in about 30 seconds at Yarragadee. We'll pick you up in another minute over Orroral.

SPACECRAFT Okay.

CAPCOM Columbia, we're back with you for about 5 minutes here at Orroral.

SPACECRAFT Okay, and we copy. Is this Dick?

CAPCOM Still Jon. If you get a chance we'd like a torqueing angles for the last IMU alignment.

SPACECRAFT Okay. Ready to copy?

CAPCOM We're ready.

SPACECRAFT Okay, stars 5 1 and 2 2 angular error zero now follows delta X, +.01, -.06, +.17, delta Y, +.03, +.01, -.22, delta Z, -.02, +.016, -.15. Execution time 4 days and 19 hours, zero zero minutes and 12 seconds.

CAPCOM Okay, we copy all those. We've got one minor DAP configuration we'd like to ...

SPACECRAFT Okay, go ahead.

CAPCOM (garble) that looks like you just caught it.

SPACECRAFT We changed DAP's to DAP A1 at, when we broke PTC.

CAPCOM Yes, we see that now and everything looks nominal.
END OF TAPE

CAPCOM ...and it looks like we just got it.

SPACECRAFT We changed DAP's to DAP A1 at, when we broke the PTC.

CAPCOM Yes we see that now and everything looks nominal.

SPACECRAFT And Jon I started the fuel cell purge.

CAPCOM Okay Bob.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT Okay, we'll do the DFI powerup if you're ready down there.

CAPCOM Okay, we're ready for that, go ahead.

SPACECRAFT Okay it's on. Let us know when you want it off.

CAPCOM We copy, we're a little under 2 minutes here to an LOS at Orroral. We're going to turn you over to the ivory team for the entry, and once again we certainly have enjoyed working with you and we'll see you back in town this evening.

SPACECRAFT Thanks alot Jon, we've enjoyed working with your team too. And it won't be long until we see you.

Okay Jon go out and have a cool one on us okay?

CAPCOM Or two.

SPACECRAFT Is that runway 22 in West Virginia?

CAPCOM I'm sure we could find you one up there somewhere.

SPACECRAFT Thank you Jon.

CAPCOM Thanks guys, have a good one, we'll see you.

SPACECRAFT Hey Bob.

PAO This is Mission Control Houston. Columbia now beyond range of the Orroral tracking station, we acquire signal again in half an hour from now through the Mila station. Columbia in orbit number 78, nearly 4 more orbits remaining before reentry and landing at mission elapsed time 4 days 19 hours 15 minutes this is Shuttle Mission Control.

SPACECRAFT (garble)

PAO This is Shuttle Control at 4 days 19 hours 45 minutes mission elapsed time. Columbia's about 25 seconds away from acquisition through the Merritt Island station. Now on orbit number 78. Here in the Control Center the entry team...

CAPCOM with you through Mila for 7 minutes.

SPACECRAFT Roger Houston, loud and clear.

PAO Entry team hit it..

CAPCOM Go ahead Columbia.

SPACECRAFT Are we going to be getting PADS later this morning? I know we never particularly end it that way, but it would be nice if we could.

CAPCOM Yes Vance, we can get them to you in about an hour probably at Yarragadee on the next pass.

SPACECRAFT Okay, super.

PAO This is Shuttle Control. The handover to the entry team lead by Flight Director Tom Holloway is complete now. CAPCOM's are Bob Stewart and Roy Bridges.

SPACECRAFT Columbia here Houston, Columbia

CAPCOM Go ahead Columbia.

SPACECRAFT Right that's Houston/Columbia or Columbia/Houston whichever the case may be. Bob we feel the report wasn't that we showed up yesterday and our excitement on all and we forgot the - port payload bay lights were not working yesterday, the forward payload bay lights were not working, the payload bay lights were not working, they would not come on and we tried them again right now and they're not coming on, so it looks like you have to add those (garble) something's wrong with them.

CAPCOM Okay Bob we copy, forward payload bay door lights, payload bay lights.

SPACECRAFT Yes that's affirm.

CAPCOM Bob, for clarification, are you talking about the port starboard lights or the bulkhead lights?

SPACECRAFT Port starboard, not the bulkhead.

CAPCOM Okay.

SPACECRAFT Bob we just tried the bulkhead, it is working it is

SPACECRAFT ...we just tried the bulkhead. It is working as the port starboard forward.

CAPCOM Okay, we've got it. And, Bob, I've got your CRT timer update if you want to copy it now or I can give it to you later as you desire.

SPACECRAFT We're ready to copy.

CAPCOM Okay, it looks mighty nominal item 17 + 0 1 + 1 7 + 0 0.

SPACECRAFT Okay, Bob, that's item 17 + 0 1 + 1 7 + 0 0.

CAPCOM That's affirm.

SPACECRAFT Houston, Columbia, are you there?

CAPCOM Roger, we're still with you.

SPACECRAFT Just thought I'd pass word. We're sitting here reviewing the deorbit prep and noticing some of the humor. These are some good laughs.

CAPCOM Anything to keep the troupes entertained. We know you're probably pretty bored up there this morning.

SPACECRAFT Well it isn't too bad. You sent me up here a little while ago to see if I could see the equator, and I'm trying to make it through it's dark out here.

CAPCOM With that 28 and 1/2 degree inclination the equator's painted on the water most of the way around, kind of washes out occasionally.

SPACECRAFT I keep trying to look for that redline. All my maps have redline but it wasn't there. Okay, and Bob, was EECOM status out of the fuel cell purge?

CAPCOM Standby Robert, we're 40 seconds to LOS. I'll get back to you. Bob, EECOM says the last fuel cell purge looked superb.

SPACECRAFT Okay, good, we'll check that one off.

CAPCOM Okay, we're 30 seconds to LOS. We'll talk to you next through Dakar at 1 8 2 7.

SPACECRAFT Okay, we'll be there.

CAPCOM And Columbia, this is Houston. Let's make that Dakar at 2 0 0 1. I'm on the wrong page here.

SPACECRAFT Got you, we've been doing that too so don't feel so bad.

PAO This is Shuttle Control. Bermuda has loss of signal. Next acquisition with Columbia through Dakar in 3 minutes. Breakfast time aboard Columbia. At 4 days 19 hours 58 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control. Dakar has acquisition now at 4 days 20 hours 2 minutes.

CAPCOM Columbia, this is Houston through Dakar for 7 and 1/2 minutes.

SPACECRAFT Okay, Rob.

CAPCOM Columbia, we're 20 seconds to LOS through Dakar. We'll talk to you next through Indian Ocean station at 2 0 2 1.

SPACECRAFT Roger, Houston.

PAO This is Shuttle Control. Columbia is out of range of the Dakar station. The Indian Ocean station will pick up Columbia in 11 minutes. At 4 days 20 hours 10 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 4 days 20 hours 20 minutes mission elapsed time. Standing by for acquisition through the Indian Ocean station.

CAPCOM Columbia, this is Houston with you through Indian Ocean for 6 and 1/2 minutes.

SPACECRAFT Roger, Houston, just crossing into the Indian Ocean from Africa now.

CAPCOM How was breakfast, Vance?

SPACECRAFT Real good. We had hot coffee, everything else was cold, and I guess everybody ate a fair amount.

END OF TAPE

CAPCOM How was breakfast Vance?

SPACECRAFT Oh, real good, we had hot coffee, everything else was cold, and I guess everybody ate a fair amount.

CAPCOM Did everybody have hot coffee?

SPACECRAFT At least part of us did. I'm not so sure about Bob. Bob's still looking for his, Robert.

CAPCOM That was the aim of the question.

SPACECRAFT He's not smiling.

we get over to You might be sure that when we get down that, and the, away from the bird, that Bob can get a cup.

CAPCOM We'll see what we can do.

SPACECRAFT That's with cream and sugar.

CAPCOM We copy. Cream and sugar.

SPACECRAFT Oh, sorry about that. Just cream.

CAPCOM Okay, cancel the sugar, just cream.

SPACECRAFT And Bob, the OEX power is on.

CAPCOM Okay, we copy the OEX is on. Columbia, we're 30 seconds to LOS at Indian Ocean. We'll talk to you next thru Yarragadee at 2 0 3 6.

SPACECRAFT Okay, see you at Yarragadee.

PAO This is Shuttle Control. Loss of signal with Columbia at the Indian Ocean station. Next acquisition thru Yarragadee in 8 minutes. At 4 days, 20 hours, 28 minutes mission elapsed time. This is Shuttle Control Houston. This is Shuttle Control at 4 days, 20 hours, 36 minutes mission elapsed time. We have acquisition thru Yarragadee.

CAPCOM Columbia, this is Houston. With you thru Yarragadee for 6 minutes.

SPACECRAFT Okay, Houston. We're with you. And Houston, Columbia. Do you still want the strain gauge signal conditioners on on the DFI?

CAPCOM Columbia, this is Houston. Yes, you might as well just leave those on Bill.

SPACECRAFT Okay, we'll leave them on.

CAPCOM Columbia, this is Houston.

SPACECRAFT Go ahead Houston.

CAPCOM Yes Joe, I think we're going to have to renege on our promise of getting you some PADS at Yarragadee. We'll try again on the (garble) pass.

SPACECRAFT Okay, we copy.

CAPCOM Columbia, Houston. We're going LOS at Yarragadee, we'll talk to you thru Orroral in a couple of minutes.

SPACECRAFT Okay.

CAPCOM Columbia, this is Houston thru Orroral for about a minute and 1/2 .

SPACECRAFT Okay, Houston. Sounds okay to you we'll start on the RAD bypass FCS checkout.

CAPCOM Standby a second on that Vance.

SPACECRAFT Okay. And Bob, its time to bring the MS seat back up to the flight deck. Would you ask Mr. Abbey if he's going to help?

CAPCOM Vance you're go on the RADS.

SPACECRAFT Roger go.

CAPCOM And for Joe, I bet he wishes he could get up there and help you.

SPACECRAFT That seat's heavy.

CAPCOM We prefer to say massive.

SPACECRAFT Right on, right on.

CAPCOM And Columbia, we're 10 seconds to LOS at Orroral, we'll talk to you next thru Buckhorn at 2 1 1 4.

END OF TAPE

CAPCOM We prefer to say massive.

SPACECRAFT Right on, right on.

CAPCOM And Columbia, we're 10 seconds to LOS at Orroral. We'll talk to you next through Buckhorn at 2 1 1 4.

SPACECRAFT Okay, Bob, we copy.

PAO This is Shuttle Control. Columbia's moved out of range at Orroral. Next station Buckhorn in California in 25 and 1/2 minutes. At 4 days 20 hours 48 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 4 days 21 hours 13 minutes mission elapsed time. Columbia's approaching acquisition through Buckhorn.

CAPCOM Columbia, Houston, with you at Buckhorn for 5 minutes.

SPACECRAFT Roger, Houston, this is Columbia. Advise we did the (garble) checkout. Did it twice. Have more data than you need. The second time it was done right.

CAPCOM Roger, copy Vance. Columbia, Houston.

SPACECRAFT Yes.

CAPCOM Roger, we have the preliminary PADS available one orbit early if you're interested in copying.

SPACECRAFT Standby. Which PAD are you starting with Roy?

CAPCOM Yes, I'll give you the DEL PAD first.

SPACECRAFT Ready.

CAPCOM Okay, burn attitude row 1 5 4 2 3 2.

SPACECRAFT Hey, hold it. Start again please. Hey Joe.

CAPCOM Roger, burn attitude roll 1 5 4 2 3 2 3 4 9.
Target height of apogee 1 5 5 + all balls. Delta V total 2 6 8 .
7 2 2 4 propellant + all balls. TIG slip all balls 0 8 5 0 8 5 8
5 1 5 2 5 7 8 3 8. forward dump RCS 2 percent all balls 1 0 9 3
. 2 + 1 . 0 over. Columbia, Houston, how copy?

SPACECRAFT Okay, Roy, how do you read me?

CAPCOM Okay, you're five by.

SPACECRAFT Okay, I'm sorry had a switch out. Roll 1 5 4,
pitch 2 3 2, yaw 3 4 9, HA 1 5 5 + all balls. 2 6 8 . 7, 2 : 2 4

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all balls all balls. 0 8 5 0 8 5 8 5 1 5 2 5 7 8 3 8 forward RCS
dump 20. 1 0 niner 3 . 2 + 1 . 0.

CAPCOM Okay, that was a good read back. We're about 1
minute LOS and I'll wait and read the second part of the PAD when
we pick you up at Mila at 2 1.

SPACECRAFT Okay, Roy, super. Sorry on that switch.

CAPCOM Oh, no problem. Columbia, Houston with you
through Mila and Bermuda for 12 minutes.

SPACECRAFT Okay, and we're ready again.

CAPCOM Okay, second half of the DEL PAD. Roll 1 8 8,
pitch 1 0 5, yaw 0 2 9. Check left all balls. Guam AOS 0 9.

END OF TAPE

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CAPCOM ...188, pitch 105, yaw 029, check left, all balls
Guam AOS 09, 03, 29.95, 01:48:50, 11299, check left overhead 200,
Edwards 22. Winds 50,000, 26065, 260130, 25070, 24025, 21010,
surface calm, APU start sequence, 3 then 2.

SPACECRAFT Okay Roy, we've got it, roll 188, pitch 105, yaw
029, left, all balls, EI 090329.95 014850 11299, left overhead
200, Edwards 22. 26065, 260130, 25070, 24025, 21010, calm, 3
then 2.

CAPCOM Okay good read back Bob and I'm ready for the
maneuver PAD now if you're ready? Columbia, Houston, how do you
read?

SPACECRAFT Okay Roy, okay we got (garble).

CAPCOM Okay. OMS (garble), check, TV rho 180 -0.1, -5.7
+ 5.7, 209621, TIG 005/01:17:20.9, TIG 4 C1 14811 -0.5958,
065.832, theta T 111.157 + all balls, X7 delta VX -0262 3 + all
balls -058.3, over.

SPACECRAFT Okay OMS (garble) TV rho 180 TMBU -0.1, -5.7 +
5.7, 209621, TIG is 005011720.9, 14811 -0.5958, 065.832, 111.157
+ all balls, -0262.3, - all balls and -058.3.

CAPCOM Okay that was a good read back and on, ready on
the next half.

SPACECRAFT Go ahead.

CAPCOM Roll 154, pitch 232, yaw 349, range to entry
interface 403624:24, delta V total, 0268.7 02:24, VGO X +0258.49,
- all balls + 073.52, target out of apogee 15...

END OF TAPE

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CAPCOM ...X + 0 2 5 8 . 4 9 - all balls + 0 7 3 . 5 2.
Target out of apogee 1 5 5, perigee + all balls, over.

SPACECRAFT Okay, Roy, you had a fade out right in the middle
of delta V total. But here goes, burn out 1 5 4 2 3 2 3 4 9, REI
4 0 3 6 2 4 : 2 4, delta V total at TGO we missed, VGO X + 0 2 5
8 . 4 9 + all balls + 0 7 3 . 5 2. HA is 1 5 5. HP is all
zeroes. Go ahead with delta V total at TGO, please.

CAPCOM Roger, delta V total is 0 2 6 8 . 7 TGO 0 2 : 2 4,
over.

SPACECRAFT Okay, 0 2 6 8 . 7, 0 2 2 4. And we just got a
forward RCS down jet message. We'll check it out.

CAPCOM Roger.

SPACECRAFT And we just got a fail off 1 forward F4 delta
(garble) that delta fail off.

CAPCOM Roger, we see that Bob. And Columbia, Houston, no
impact no action.

SPACECRAFT Understand. We'll leave it the way it is.

CAPCOM Columbia, Houston.

SPACECRAFT Go ahead Houston.

CAPCOM Roger, like to give you an optional action that
you can do now. In the orbit OPS checklist on page 1-2 you can
do the hydraulic thermal conditioning terminate at you
convenience.

SPACECRAFT It's in work.

CAPCOM Columbia, Houston.

SPACECRAFT Go ahead Houston.

CAPCOM Roger, Vance, another discretionary item. If you
have an opportunity to set up the VTR we would like to get some
VTR of the sunshield opening.

SPACECRAFT Okay, that's in work.

CAPCOM Columbia, Houston, 30 seconds to LOS. See you at
Dakar at 3 7.

SPACECRAFT See you at 3 7.

PAO This is Shuttle Control. Bermuda has loss of

signal. One of the forward reaction control system jets has failed off. Specifically F4D. There's no impact and no action required for the failure. During this pass information for the deorbit burn was read up to the crew by CAPCOM Roy Bridges. The ignition time for that burn 5 days 1 hour 17 minutes 20 seconds. A change in velocity of 268.7 feet per second. Burn time 2 minutes 24 seconds. Targeted to an orbit of with an apogee of 155 nautical miles and a perigee of 0 miles. Next station is Dakar in about minute and a half. We'll standby. At 4 days 21 hours 35 minutes.

CAPCOM Columbia, Houston with you at Dakar for 7 and 1/2 minutes.

SPACECRAFT Houston. Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT We have a ...

END OF TAPE

CAPCOM Columbia, Houston, with you at Dakar for 7 1/2 minutes.

SPACECRAFT Roger, Houston. Houston, Columbia

CAPCOM Go ahead.

SPACECRAFT Do we have a go to close those payload bay doors, or to go ahead and get those sunshields open to Sun?

CAPCOM Standby. Columbia, Houston. Your go to close, to open the sunshields and close the doors at the scheduled time.

SPACECRAFT Okay, we'll hold.

CAPCOM Columbia, Houston. Your 30 seconds LOS and we'll see you at Botswana at 55.

SPACECRAFT Okay.

PAO This is Shuttle Control. Columbia is out of range at Dakar. Next station, Botswana in 10 1/2 minutes. Crew has been given a go to close the payload bay doors at the scheduled time. Those doors closing starts just prior to acquisition at Yarragadee on this pass. At 4 days, 21 hours, 45 minutes mission elapsed time. This Shuttle Control Houston.

NASA 962 NASA 962, Houston.

NASA 962 This is 962, over.

NASA 962 This is NASA 962, read you loud and clear over.

NASA 962 This is NASA 9 6 2, read you loud and clear on 2597.

CAPCOM And 962, this is Houston. How do you hear?

NASA 962 Read you loud and clear, Houston on 2597.

CAPCOM Okay, you're loud and clear and we're standing by for your report.

NASA 962 We ran in the cirrus at 16,000 came out at about 33,000 it's real clear, you can see the ground at 22,000 but above that it's overcast. About 43,000, getting their (garble).

CAPCOM Okay, we copy cirrus deck from 16 to 33,000, and you can see the ground at 22,000 and above that you're above the overcast.

NASA 962 We're in the cirrus, right.

CAPCOM Roger.

NASA 962 It's super towards (garble) and it seems to thin out over the lakebed, but we can't fly out over the lakebed now, we can't see it.

CAPCOM Roger.

NASA 962 And the winds are calm on the surface.

CAPCOM Roger, we copy.

NASA 962 (garble) thin, put down from LA we can see the lights over there. We can't tell where there's any (garble) or not, but the first part of it we had some (garble).

CAPCOM Roger.

PAO This is Shuttle Control, the air-to-ground currently on the loop, is aircraft airborne in the Edwards Air Force Base area, talking to CAPCOM here about weather.

NASA 962 The estimate of the wind about 4 3 0 is about 110 knots on the nose.

CAPCOM Roger, copy. 110.

NASA 962 From the west, and that's just a rough guess.

CAPCOM Roger, that's right on as far as forecast.

NASA 962 Okay. 962, we just rolled up on the wind and we can see the ground right now from 43,000.

CAPCOM Roger, copy. You've got a break in the overcast at 43.

NASA 962 I think we're about right over the fifth.

CAPCOM Roger. 962 Houston, we're going to have to drop off to pick up Columbia at Botswana, we'll be back to you...

END OF TAPE

CAPCOM Copy, you've got a break in the overcast at 43.

NASA 962 (garble) about right over the field.

CAPCOM Roger. 962, Houston. We're going to have to drop off to pick up Columbia at Botswana. We'll be back to you after LOS here in about 6 minutes.

NASA 962 962.

PAO This is Shuttle Control at 4 days 21 hours 54 minutes mission elapsed time. Columbia coming up on acquisition through Botswana.

CAPCOM Columbia, Houston with you through Botswana for 3 minutes. Columbia, Houston through Botswana for 3 minutes.

SPACECRAFT Okay, Roy, we're ready and we're standing by. We've got the sunshields open ready for your go to close the payload bay doors.

CAPCOM You're go. And Columbia, Houston, we're going LOS. We'll pick you up at Botswana, Yarragadee at 1 2.

SPACECRAFT Roger.

CAPCOM NASA 962, Houston.

NASA 962 962, Ben.

CAPCOM Roger, you're loud and clear, and anything else to report?

NASA 962 No, we're going to make another approach. We're going to make an approach going through the clouds about where we think the vehicle would, and see where they can see the ground, and report that and that'll be it.

CAPCOM Okay, real good. And have you encountered any turbulence at all?

NASA 962 A slight turbulence up here at 4 3 0.

CAPCOM Okay.

NASA 962 (garble) but it's not very much. I don't think the Orbiter would notice it.

CAPCOM Roger.

PAO This is Shuttle Control. That was another weather report from the Edwards Air Force Base area from astronauts John

Young and Mike Smith flying in a NASA T38 number 962. Later this morning John Young will be making some approach and landing runs to the runway in one of the Shuttle training aircraft. At the present, he and Mike Smith are airborne in a T38 in the Edwards area checking weather. We'll continue to standby. Well, we've had loss of signal now at Botswana. Yarragadee is next in 12 minutes. Payload bay doors closing procedure should begin just prior to Yarragadee acquisition. Clock has started counting down to deorbit ignition mission here in the Mission Control center. Shows 3 hours 17 minutes 3 seconds to that OMS maneuver. At 4 days 22 hours mission elapsed time this is Shuttle Control Houston.

CAPCOM Houston, 962, you called?

NASA 962 That's negative.

NASA 962 Houston, 962, over.

CAPCOM 962 Houston, go.

NASA 962 Roger, we ran into 33, 500. Came out at 17,000 and we could see all the way through it. It's just very thin stuff right now.

CAPCOM Okay, so you could see through it all the way down?

NASA 962 I could see lights through it. I don't know when we get a little more lights we'll be able to see if you can see the ground but we could sure see lights through it all the way to the ground.

CAPCOM Okay, that sounds encouraging and guess we'll have a little more discussion on this when you get on the ground.

NASA 962 Okay, and it's clearing (garble) below it.

CAPCOM Okay, that's good. Well, we'll talk to you on the ground then.

NASA 962 Yes.

CAPCOM Thank you very much. Columbia, Houston. With you through Yarragadee for 7 and 1/2 minutes.

SPACECRAFT Okay, Houston, how do you copy?

CAPCOM You're five by.

SPACECRAFT Okay, Roy, good news and bad news. Good news is the doors...
END OF TAPE

CAPCOM Columbia, Houston with you at Yarragadee for 7 and one half minutes.

SPACECRAFT Okay Houston, how do you copy?

CAPCOM Your 5-by.

SPACECRAFT Okay Roy, good news and bad news, good news is the doors closed absolutely nominally, as far as doors went and they are closed and sputting up. (garble) just to the point where I stopped it's motion to make it, make the check, the AC overvolt came on and the AC's volt light came on and AC volt, AC 1, phase bravo dropped off as showing less then 50 volts, and zero amps. I got in deorbit OPS pocket checklist, I stopped at step 2 thinking you might want to watch me bring that back on the line, over.

CAPCOM Roger and stand by, we'll take a look at it. Columbia, Houston, we'll have to wait till Hawaii to get data, but we would like for you to wait and let us watch it.

SPACECRAFT It's your call, now I haven't hit the bus loss problem yet, do we lose any important data between now and then that you might want on or any switching that you wanted done?

CAPCOM Copy your question and we'll get an answer for you in a couple of minutes.

SPACECRAFT Roy according to my book we don't lose a whole lot that we can't live without until we get you to Hawaii.

CAPCOM Roger.

SPACECRAFT And to clarify your position I have stopped at step 2 of page 5-3 of the orbit pocket checklist, and waiting to reset that phase.

CAPCOM Roger, copy.

SPACECRAFT And by the way Roy, all the motors stopping, all the doors closed with dual motor time or better.

CAPCOM Roger, copy Bob.

SPACECRAFT And I emphasis that that overvolt came at just at the instant as I was stopping the starboard doors.

CAPCOM Roger.

SPACECRAFT Okay Roy, how do you read CDR on PS panel?

CAPCOM Read you 5-by Vance.

SPACECRAFT Good. Roy, this is Bill, I'm getting ready to push in the circuit breaker at R15 fox trout, essential IBC audio left closed.

CAPCOM Okay Bill.

SPACECRAFT What breaker was that.

CAPCOM Okay we copy Bill and we have no problem with you resetting that. Columbia, Houston.

SPACECRAFT Go ahead Dave.

CAPCOM Roger, I'd like to ask Bob a question about the order in which he got the caution and warning? Could you describe that for us again Bob which messages came first?

SPACECRAFT Okay, well the AC volt message came first, and the AC overload message came second up on the false. They would then, at (garble) time, so they're essentially one right on top of the other. The first light we saw was the AC overvolt, because of our CRT configuration Bill was in the front seat handling the CRT while I was in the back seat handling the door switch and consequently he called overvolt and, overload and volt simultaneously to me.

CAPCOM Roger copy.

SPACECRAFT And I got one for IMU, we're already been recording the position where the extended guide roll trajectory with first hit, it looked like every single one of them, as best I could tell with my binoculars were going to hit right slightly above point alpha, right just about nominal, right about point alpha.

CAPCOM Okay we copy. Columbia, Houston, could you send somebody real quickly to MA73C and check the circuit breaker? I'll give you these circuit breakers.

SPACECRAFT Okay, I'll go.

CAPCOM Roger the MCA circuit breaker.

SPACECRAFT Go ahead Roy.

CAPCOM The MCA circuit breaker, on AC 1.

SPACECRAFT All in. They're all in Roy.

CAPCOM Okay thank you, we'll see you at Hawaii and we're LOS.

SPACECRAFT Okay, sorry. END OF TAPE

CAPCOM Columbia, Houston. Could you send somebody real quick to MA73C and check the circuit breaker. I'll give you the circuit breaker.

SPACECRAFT Tell Joe, go.

CAPCOM Roger the MCA circuit breaker.

SPACECRAFT Go ahead, Roy.

CAPCOM The MCA circuit breaker on AC 1.

SPACECRAFT They're all in. They're all in Roy.

CAPCOM Okay, thank you we'll see you in Hawaii. We're LOS.

SPACECRAFT Okay, sorry.

PAO This is Shuttle Control. Yarragadee has loss of signal Columbia, moving on a track now that will take us over Hawaii. That station in 16 1/2 minutes. Columbia's payload bay doors are closed and latched and as Bob Overmyer reported they received an AC overvolt message on the caution system and he has gone thru partially a malfunction procedure, but we'll hold off completing that procedure, until Columbia gets to Hawaii, so that EECOM here in the Mission Control Center can observe these procedures thru telemetry. We, Yarragadee has a UHF station and we have no telemetry at that station. This, overvoltage knocked one of the inverters offline. This procedure is to place this inverter back online. At 4 days, 22 hours 22 minutes, mission elapsed time. This is Shuttle Control Houston. This is Shuttle Control. We have acquisition thru Hawaii we'll standby.

CAPCOM Columbia, Houston. With you at Hawaii for 6 and 1/2 minutes.

SPACECRAFT Okay, Roy go.

CAPCOM Okay, we would like to take a look at the data here a for awhile. And we'd just like you to standby on this AC problem. and we'll be giving you a go.

SPACECRAFT I heard that and Houston, Columbia, the alignment and alignment verification is complete and anytime you want, I can give you the results.

CAPCOM Okay, Vance. We copy that. And standby just a moment.

SPACECRAFT Roger.

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CAPCOM Okay, Columbia, Houston. Bob we'd like for you to go ahead with step two of the AC overload procedure.

SPACECRAFT They would? Okay, the reset phase is 118 volts and 5.0 amps. Looking great.

CAPCOM Okay, we copy.

SPACECRAFT And I've pulled the AC control circuit breaker going back to auto-trip and I'm going to exit the procedure, consider it done. Roy.

CAPCOM Standby. Columbia, Houston. Bob, we just want to pass on to you the good news, we've recovered the AC and we see that no further action required.

SPACECRAFT I understand Roy, and if between now and the next time to you, you figure out that it was one of those door motors that we don't have to worrying about, I would appreciate knowing it. I would appreciate knowing about it.

CAPCOM Okay, that's what we think at this time. We're still looking into it but we don't see any other anomalies currently, so suggest you all just press on and not worry about it.

SPACECRAFT Yes, we're pressing.

CAPCOM Columbia Houston. Vance, have the verification numbers, all we need is the torquing numbers and the time for the first alignment.

SPACECRAFT Roger. first alignment, stars 3 7 and 2 3 error .01...

END OF TAPE

CAPCOM ...numbers. All we need are the torquing and the time for the first alignment.

SPACECRAFT Roger, first alignment, stars 3 7 and 2 3, error .01, starting out angles delta X + .0 2 - .0 3 - .0 8, delta Y - .0 3 - .0 1 - .0 4, delta X - .0 4 - .0 2 - .0 6. Executed 2 hours 48 minutes 30 seconds. TIG minus.

CAPCOM Roger, copy. Columbia, Houston, 30 seconds to LOS. We'll see you at Buckhorn at 4 8.

SPACECRAFT Okay, see you at Buckhorn.

CAPCOM Columbia, Houston with you through Buckhorn for 8 minutes.

SPACECRAFT Roger, Roy. Roy, we're on schedule.

CAPCOM Roger, great Vance.

SPACECRAFT And (garble) controllers coming on Roy.

CAPCOM Roger, copy, and we would like to have a GNC SPEC 1 for variable parameters.

SPACECRAFT Okay, you got it on CRT 3.

CAPCOM Columbia, Houston, you can have your CRT back.

SPACECRAFT Roger.

CAPCOM Columbia, Houston, we're 30 seconds to LOS. We'll see you over Mila at 5 7.

SPACECRAFT Okay, see you in about 10 minutes.

CAPCOM Columbia, Houston, with you through Mila and Bermuda for 11 minutes. Columbia, Houston, with you through Mila and Bermuda for 10 and 1/2 minutes.

SPACECRAFT Roger, Houston, we've got you.

CAPCOM Okay, Vance, I've got one flight note regarding the ASC PAM heater switch.

SPACECRAFT Go ahead, we have a man at the panel.

CAPCOM Okay, the ground telemetry shows that both the ANIK and the SBS ASC PAM heater relays are in the auto position and we'd like to request that you confirm that the switches on panel L11 are off with a talkback barberpole and using the procedure on your cue card.

SPACECRAFT That's in work. It's done.

CAPCOM Columbia, Houston, Joe, I'd like to confirm how you did that procedure. I may have mislead you a little bit.

SPACECRAFT Roy, we turned the ISOL PCM power on so we could see the talkback. We flipped the switch off, verified and went barberpole. And then took the ISOL PCM power off.

CAPCOM Okay, that's exactly what we wanted you to do, thank you. Columbia, Houston, Vance, I'd like to discuss the deorbit burn a little bit and the weather if you have a minute.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, first of all, you don't need to look for any cue cards today. There are no changes to the deorbit burn flight rules. And secondly, the weather at Edwards is a little less than we would like for your coming home. You may have noticed in your forecast we gave you earlier that we have some broken clouds. Weather reports that there is a thin clouddeck running from flight level 330 tops down to 17.5 MSI. It's a fairly thin deck, of course, it's pretty dark out there still, but they can see lights through it right now. We would expect that deck of clouds to remain with us for the rest of the morning, over.

SPACECRAFT Okay, understand the bases are about 17.5.

CAPCOM That's affirmative. And the forecast is running...

END OF TAPE

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CAPCOM ...for the rest of the morning, over.

SPACECRAFT Okay, understand the bases are about 1.75

CAPCOM That's affirmative and the forecast is running pretty close to this, they would expect 2 layers there, one starting about the altitude.

SPACECRAFT Okay, doesn't sound ideal, but doesn't sound too bad.

CAPCOM Roger and it looks like the winds at 40,000 and with the last balloon are running around 100 knots instead of the 130 that we sent you on the PAD, however, the forecast holds, we would anticipate winds varying anywhere from 100 to 130 knots near the hat.

SPACECRAFT Okay, well we'll be alert on the hat. I think we could fly needles, but we would be alert to pull the nose up a little bit, and bring the boards in if required?

CAPCOM Okay, well we, we see no need for manual intervention, flying the higher winds in the SMS they saw MAX roll angles of about 55 degrees, about 1.75 g's.

SPACECRAFT Okay, sounds like it's okay.

CAPCOM Roger, it sounds real good Vance and of course, the way things stand right now, if you had any doubts at all you could use full auto control all the way around the hat, it would be your call.

SPACECRAFT Understand, thank you.

CAPCOM Columbia, Houston. You have a GO for OPS 3 and Vance I have one other comment concerning the landing area.

SPACECRAFT GO for OPS 3 transition and go ahead.

CAPCOM Roger, to aid the STA pilots this morning, primarily they have the night lighting rigs set up on runway 22. There's one unit on each side of the runway at the threshold, about 250 feet from the center line, pointing down the runway to illuminate the touchdown area, you may not notice it during your landing since you'll be landing after sunrise, however you may see it as you're coming over the field onto the hat.

SPACECRAFT Okay good, and understand the main reason for it is to illuminate the touchdown zone.

CAPCOM That's affirmative. And it's primarily for the

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STA Vance, I just thought in case you saw it I'd make you aware of it.

SPACECRAFT Okay.

CAPCOM We'll see you at Dakar at 13.

SPACECRAFT Roger.

PAO This is Shuttle Control, Bermuda has loss of signal now. Next acquisition through Dakar in 6 minutes. Columbia's crew is on the timeline this morning and has just received a GO for OPS 3, a onboard computer program for entry. At 4 days 23 hours 7 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM Columbia, Houston, with you through Dakar and Ascension for 10 minutes. Columbia, Houston, with you through Dakar and Ascension for 10 minutes.

SPACECRAFT Roger Bob, we copy and we're working.

CAPCOM Okay you're 5-by. Columbia, Houston, we have some targets on the way for the VFS.

SPACECRAFT Understand.

CAPCOM Columbia, Houston, configure AOS for the uplink.

SPACECRAFT Roger, I'll get it. Houston, we'll hold in our (garble) three configuration procedures till you finish your uplink.

END OF TAPE

SPACECRAFT ...Houston we'll hold in our (garble) configuration procedures till you finish your uplinking.

CAPCOM And Columbia, Houston, we're going LOS now, configure LOS, we'll see you at Botswana at 27 and you can press on with your procedure.

SPACECRAFT Okay, are next step is BFS GNC OPS 000.

CAPCOM Yes, we'll have to ship you that target probably at Hawaii.

SPACECRAFT Okay.

PAO This is Shuttle Control, Columbia's moved out of range of Ascension Island. Acquisition through Botswana in 3 minutes. We'll standby for conversation through Botswana. Clock shows 1 minute 52 seconds, 1 minute, 52 minutes 40 seconds from deorbit ignition. This is Shuttle Control, Botswana has acquisition now.

CAPCOM Columbia, Houston, with you through Botswana for 8 minutes.

SPACECRAFT Roger.

CAPCOM Columbia, Houston, Vance, would like to know when you loaded the BFS computer outputs switch to backup.

SPACECRAFT Stand by.

CAPCOM And really Vance, the reason I'm asking, I'd like to know if you did it after we went LOS at Dakar.

SPACECRAFT Okay, we got it.

CAPCOM Okay, thank you Vance. Columbia, Houston we're 30 seconds LOS, see you at Yarragadee at 47.

PAO This is Shuttle Control, Botswana has loss of signal, the crew aboard Columbia busy with entry preparations. Next station is Yarragadee in 12 minutes. Flight Dynamic's Officer Willis Bolt has generated a final setup projection on some of the entry event times. The deorbit ignition scheduled for 5 days 1 hour 17 minutes 21 seconds, entry interface 5 days 1 hour 44 minutes 11 seconds. Begin blackout at 5 days 1 hours 46 minutes 42 seconds, blackout ends at 5 days 2 hours 1 minute 27 seconds, touchdown at 5 days 2 hours 14 minutes 40 seconds. The 4 general purpose computers aboard Columbia with the primary flight system have been loaded with the entry program and completion of loading the backup flight system into the backup computer will be at Hawaii where we will have some command

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capability. We're at 1 hour 39 minutes 26 seconds away from deorbit. And mission elapsed time is 4 days 23 hours 38 minutes. This is Shuttle Control Houston.

CAPCOM Columbia, Houston, with you at Yarragadee for 6 minutes.

SPACECRAFT Roger Houston, loud and clear.

CAPCOM And you're loud and clear and we have nothing for you now, standing by.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, 30 seconds LOS, we'll see you at Guam at about 1 minute after the hour.

END OF TAPE

CAPCOM Columbia, Houston, with you at Yarragadee for 6 minutes.

SPACECRAFT Roger, Houston, loud and clear.

CAPCOM And you're loud and clear and we have nothing for you now, standing by.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, 30 seconds to LOS. We'll see you at Guam at about 1 minute after the hour.

PAO This is Shuttle Control. Yarragadee has loss of signal. Columbia will be acquired by the Guam station on this orbit in 6 and 1/2 minutes. Then we will begin orbit number 81 shortly after acquisition. 81 is the orbit in which the deorbit burn will be made down over the Indian Ocean in 1 hour 21 minutes 40 seconds. At 4 days 23 hours 55 minutes this is Shuttle Control Houston. Shuttle Control. Guam has acquisition at 5 days 1 minute mission elapsed time.

CAPCOM Columbia, Houston with you through Guam for 3 minutes. Configure AOS.

SPACECRAFT Okay, Roy, you got AOS.

CAPCOM Roger, and you're five by.

SPACECRAFT Roger, Roy, on the payload recorder I have moved it from mode select to function operate per the switch checklist. Just wanted to still advise?

CAPCOM Okay. Columbia, Houston, 30 seconds LOS. See you at Hawaii at 1 3. Configure LOS.

SPACECRAFT Okay, see you then, LOS configuration.

PAO This is Shuttle Control. Guam has loss of signal. Hawaii is next at about 7 minutes. Columbia now on orbit 81. At 5 days 6 minutes mission elapsed time this is Shuttle Control Houston.

NASA 946 NASA 946, Houston. NASA 946, Houston. How do you read?

NASA 946 Houston, NASA 946, over.

CAPCOM Roger, 946, you're loud and clear, go.

NASA 946 Okay, this is a weather report. Do you have time for it?

CAPCOM Vance, we've got about, sorry John, we've got about 3 minutes.

NASA 946 Okay, just roughly. There's scattered stuff at 13. At 17 you can see through it all the way to the ground. It starts at 23 and goes to 31 and you can see through that too. And in most places it's clear. There's slight to moderate turbulence starting at about 260 and then dies out at about 370. The winds are as follows. They are essentially light and variable below 20,000 feet. At 20 they're 217 at 20, at 25 230 at 50, at 30 250 at 73, at 35 250 at 70, at 37 they're 240 at 70 and that's as high as we got. And the landing pad for a touchdown at 195 knots. Looks like about 20, we landed about 2400 feet down the runway when you normalize it.

CAPCOM Okay, we copy all that, John, and I guess things are looking pretty good to you right now.

NASA 946 You bet.

CAPCOM Okay, good. And we'll pass that encouraging word onto the crew here at Hawaii and I'll be back with you after we cross the states.

NASA 946 Roger out.

END OF TAPE

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CAPCOM ...okay good. Now we'll pass that encouraging word on to the crew here at Hawaii and I'll be back with you after we cross the states.

SPACECRAFT Roger out.

PAO This is Shuttle Control that air to ground was between CAPCOM Roy Bridges here in the Mission Control Center and chief astronaut John Young, airborne in the Edwards Air Force Base area and NASA 946 the Shuttle Training Aircraft. Young is making approach runs to the runway, checking weather, wind. Columbia a minute and a half away from Hawaii now, we'll standby.

CAPCOM Columbia, Houston, with you through Hawaii for 7 minutes, configure AOS.

SPACECRAFT Roger, configure AOS.

CAPCOM And Vance, we're going to be sending you a DEU equivalent to the PASS and some uplinks of both PASS and BFS, like to ask that you call up a SPEC 0 and PASS and a caution, while we're doing this, do not call up SPEC 50.

SPACECRAFT Okay, we won't touch base while you're doing the uplinks, let us know when you're through?

CAPCOM Okay and do copy, you do not have the SPEC 50 up now do you?

SPACECRAFT We do not.

CAPCOM Okay, good.

SPACECRAFT And I gave you SPEC 0 and PASS.

CAPCOM Roger, thank you. And a couple of other items for you. On panel A14, if somebody can go to that panel, I have a switch.

SPACECRAFT Joe. Go ahead Roy.

CAPCOM Okay Joe, like for you on panel A14 to take the forward RCS heater to OFF, we see one of those in B-auto.

SPACECRAFT Roger to OFF.

CAPCOM And Columbia, Houston, Bob I have a switch for you over on panel R1, because of the anomaly we had on AC 1 phase bravo, we would like to take AC 1 bus sensor to monitor during the entry.

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SPACECRAFT Okay, you want it to go to monitor now Roy?

CAPCOM That's affirmative Bob. And we believe that it was a sensor problem that caused the anomaly.

SPACECRAFT Okay.

CAPCOM Columbia, Houston, we're complete with the SPEC 0, you can have it back now and remove any restrictions on your DPS configuration. We would like to get the CRT's assigned to the correct computers and to do that, we would like to have you take the BFC, CRT switch to OFF until the PASS picks up, and then you can turn it on again. Columbia, Houston, did you copy we're complete with the uplinks?

SPACECRAFT Yes we copied it.

CAPCOM And you should have runway 04 in the secondary slot both pass and BFS now.

SPACECRAFT Yes, we did.

CAPCOM Columbia, Houston, we're about 30 seconds LOS, we'll be seeing you at Buckhorn at 23, like for you to configure LOS and would like for you to reconfirm on page 1-12, the flight deck and the middeck PCS config.

SPACECRAFT Okay we'll recheck it Roy.

CAPCOM Thank you.

SPACECRAFT Houston, Columbia.

CAPCOM Go ahead.

SPACECRAFT System 2 N2 req inlet, do you want it open or closed for entry?

CAPCOM Want it open.

SPACECRAFT Open, Req.

PAO This is Shuttle Control, Hawaii has loss of signal. Buckhorn will see Columbia in 1 minute, so we'll stand by. Columbia now 55 minutes 17 seconds away from deorbit.

END OF TAPE

PAO Columbia now 55 minutes 17 seconds away from deorbit.

CAPCOM Columbia, Houston. With you thru Buckhorn, for 7 minutes configure AOS.

SPACECRAFT Okay, Roy, and how do you hear me thru my helmet? PLT speaking?

CAPCOM I hear you pretty clearly, Bob. Just a little bit more muffled than normal though.

SPACECRAFT Just call me old mumblemouth.

CAPCOM Sounding good.

SPACECRAFT If we can tell Flight surgeon there for me that I have 3 down and 1 to go on the PLT side. They'll know what we're talking about.

CAPCOM Okay, I understand. 3 down and 1 to go for the PLT.

SPACECRAFT That's affirm.

CAPCOM And Bob, who was that message for?

SPACECRAFT That was for Flight Sergeant.

CAPCOM Okay.

SPACECRAFT We're drinking and drinking and drinking.

CAPCOM And he copies.

SPACECRAFT You can also tell him Roy, that the lemon-lime tasted too sweet, like it didn't have enough salt in it so laced it with salt tablets also, so I think our salt tablets come in handy.

CAPCOM Okay, I'm sure he'll appreciate your enthusiasm.

SPACECRAFT He should have seen what he did with the salt tablet.

CAPCOM Okay, we copy Bill.

Roy, how do you read MS?

CAPCOM Okay, read you 5 by MS2/i is that correct?

You've got it right, and you're loud and clear as

well.

CAPCOM Roger, you're 5 by and Columbia, have you had a chance to schedule the PCS check on panel MO10W on the middeck?

SPACECRAFT Say, again what to look for Roy.

CAPCOM Well, we were looking for confirmation of the PCS reconfig on page 1-12 or better yet, just check it for the switch list on page 328 of the deorbit prep.

SPACECRAFT It's complete Roy. Roy, do you copy, that's complete.

CAPCOM Roger, copy. Standby.

SPACECRAFT Roy, we must have all gotten fat heads, these helmets are a little tighter up here after 3 days, 5 days rather.

CAPCOM Roger. Okay, Columbia, Houston. The switches on MO10W that we need rechecked are the 14.5 psi cabin reg inlet, both of them should be closed, and also we need the H2O tank N2 reg inlets, both of them to open.

SPACECRAFT Okay, Roy. Got the switch 1 to 14 7 right here is closed, and both water tanks N2 reg inlets are open and were open.

CAPCOM Okay, and we copy both reg inlets closed.

SPACECRAFT I'm sorry, say again, do you want them open or closed.

CAPCOM Okay, we want them closed and see them closed and that reconfigures is complete. Thank you very much.

SPACECRAFT Okay.

CAPCOM Columbia, Houston. You have a new vector onboard, and you're go to reload your targets.

SPACECRAFT Okay, we're reloaded.

PAO This is Shuttle Control. Buckhorn has loss of signal, but Merritt Island will pick up Columbia in about a minute and 1/2, we'll standby. Bob Overmyer on this pass had the message for the Flight Surgeon that they were drinking plenty of liquids...

CAPCOM Columbia, Houston, we went through a keyhole, we're with you through Mila now for about 6 more minutes.

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SPACECRAFT Okay Roy, and I'm take out through that (garble) entry checklist we're going to open up the fuel tank valves it's up on inert.

CAPCOM Okay and I've got an action for Bill.

SPACECRAFT Go ahead.

CAPCOM Bill, we're not copying UHF from either you or Vance, and I need for you to check to make sure your UHF COMM switches are positioned properly.

SPACECRAFT Okay this is on payload station and (garble) is on. Standby.

SPACECRAFT Radio check, how do you hear UHF Roy?

CAPCOM Okay, we copy Vance and stand by we'll check the ground...

END OF TAPE

CAPCOM ..for Vance, and I need for you to check to make sure your UHF COMM switches are positioned properly.

SPACECRAFT Okay, Vance is on payload station and the air to air TR station is on.

CAPCOM Okay.

SPACECRAFT Okay, radio check, how do you hear UHF, Roy?

CAPCOM Okay, we copy you Vance, and stand by and we'll check the ground station.

SPACECRAFT Roy, my panel is indicating that air to air is in TR.

CAPCOM Okay, and we copy that Bill, thank you.

SPACECRAFT Okay, Roy, the PLT just went ahead and got the APU tank valve open. I got 3 grays ready to start at (garble).

CAPCOM Okay, we're looking.

SPACECRAFT And Roy, can you reconfirm the altimeter setting will be 2 9 9 5.

CAPCOM Roger, we'll reconfirm, standby and I'll recheck it. We see the 3 grays for APU and we're ready for the gimbal check. Columbia, Houston. Altimeter is 2 9 9 4. We have good UHF from all four crew members. Columbia, Houston, we're standing by for the primary gimbal check. Columbia, Houston, how do you read?

SPACECRAFT Okay, we're getting it now.

CAPCOM Okay. Columbia, Houston, Vance, on panel L1 need you to take RAD controllers loop 1 and 2 to off.

SPACECRAFT Roger, they're off

CAPCOM And we verify that Vance, and we're 30 seconds LOS. See you at Ascension at 5 2. Configure LOS.

SPACECRAFT Roger, configured LOS.

CAPCOM And Columbia, Houston, that was a good gimbal check.

SPACECRAFT Super.

PAO This is Shuttle Control. Everything in order and on time as Columbia moves out of range of Bermuda on orbit 81.

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Next acquisition through Ascension Island in 14 minutes. We're 38 minutes 40 seconds away from ignition.

SPACECRAFT what the bravo leg of aft flight RCS to be GPC open.

CAPCOM I'll give you word on that at Ascension Vance.

PAO Longer acquisition at Merrit Island unexpected. We're about 12 and 1/2 minutes away from Ascension at 5 days 39 minutes mission elapsed time. This is Shuttle Control Houston.

CAPCOM NASA 946, Houston. NASA 946, Houston. NASA 946, Houston, how do you copy?

NASA 946 9 4, 946, loud and clear.

CAPCOM Roger, we're standing by when you want to give us the report.

NASA 946 946, we're climbing up another approach and there's starting about 13,000 there's a variance of layers I guess a slight turbulence. I don't think the orbiter will even notice it. And the wind right now, wind at 29,000 is 257 at 73 right now.

CAPCOM Roger.

NASA 946 And the last pass when we were in some clouds that broke out at 18,000 but it's very scattered. You can see as you went down you could see the whole lakebed source so scattered cloud deck that's low and it's very thin.

CAPCOM Okay, we copy, so everything is still looking good.

NASA 946 We're now at about 32,000. We are looking at 250 at 93 knots so the winds seems to be picking up here, may be that Jets swinging up.

CAPCOM Roger, 946 Houston, we're going to have to drop off to talk to the orbiter at Ascension. We'll pick you up again about 5:17 your time.

SPACECRAFT We're set for that (garble).

CAPCOM Roger.

CAPCOM I'm 17 your time.

SPACECRAFT 4 6 out.

CAPCOM Roger.

PAO This is Shuttle Control at 5 days 51 minutes mission elapsed time, standing by for acquisition through Ascension. This is the station where the GO NO/GO decision on the deorbit burn will be made.

CAPCOM Columbia, Houston, with you at Ascension for 6 minutes, configure AOS.

SPACECRAFT Okay Houston. We're AOS are we clear the closed vent doors.

CAPCOM Columbia, Houston, GO for vent door closing.

SPACECRAFT Columbia's (garble) at you.

CAPCOM Columbia, Houston, have a update on the weather, if you're ready to copy?

SPACECRAFT Go ahead.

CAPCOM Roger, STA reports weather picture to be very good, you do have some layered of cloud, with bases as low as 13,000 MSL, tops as high as 310, it's moving around a little bit but real good news is that they're all very thin and you can see through from the top all the way down, see the lakebed through them. They report some slight to moderate turbulence starting at about 370 and tapering off around 260.

SPACECRAFT Okay, thank you. And Vance, in answer to your question, we would like to have the right RCS helium B to open per checklist.

SPACECRAFT It's open, open and left open.

CAPCOM Roger. Columbia, Houston, we see all vents closed, and for your information, hydrylic thermal conditioning will not be required for the entry.

PAO This is Shuttle Control. The CAPCOM for entry and landing is astronaut Roy Bridges.

CAPCOM Columbia, Houston, on the RCS configuration, I'd like for you to check left and right RCS, tank ISOs, and cross the valves to TPC, the valves are in the current position.

SPACECRAFT They're there.

CAPCOM Roger. Columbia, Houston, the ascent entry team is ready for the entry, you have a GO for deorbit burn.

SPACECRAFT Roger, Roy. GO for the burn.

CAPCOM Columbia, Houston, we're 40 seconds LOS at Ascension, see you at Botswana at 03, configure LOS.

PAO This is Shuttle Control. Ascension has loss of signal. Columbia given a GO for deorbit, next acquisition through Botswana, and just under 3 minutes. It'll be about a 7 and a half minute pass and then the deorbit burn will take place in 17 minutes out over the Indian Ocean, we will not be in contact with Columbia at that time, we'll have to wait until the spacecraft reaches acquisition through Guam to find out how that burn goes.

CAPCOM NASA 946, Houston.

PAO CAPCOM Roy Bridges putting in another call to John Young in NASA 946 the Shuttle training aircraft Air 1.

CAPCOM Okay, we just gave them a GO for the burn at Ascension and we got about 2 minutes before we hit Botswana. Do you have any further update?

NASA 946 Houston, 946 go ahead.

CAPCOM Roger 946, we gave them a GO for the burn at Ascension, we've got about a minute here before we hit Botswana for an update, do you have anything?

NASA 946 No, except this low layer seems to be in and out, sometimes you're in it, sometimes you're out of it. You break out at about 18,000 right now.

CAPCOM Roger, understand, Jon, I told them it was layered, patchy but all very thin. And we did check regarding the Saint Elmo fire that you saw earlier today and in the opinion of the folks here, that's no problem.

NASA 946 46 Roger, thank you.

CAPCOM Okay, I'll talk to you after Botswana and that'll be about 5 29 your time.

NASA 946 946 roger.

END OF TAPE.

CAPCOM Okay, I'll talk to you after Botswana and that'll be about 5:29 your time.

NASA 946 946, Rog.

CAPCOM Columbia, Houston with you at Botswana for 7 minutes.

SPACECRAFT Houston, we just started maneuver of the burn attitude.

CAPCOM Copy, and you're 5 by.

SPACECRAFT Roger.

CAPCOM Columbia, Houston we're 1 minute LOS. Have a good burn and we'll see you at Guam at EI minus 9.

SPACECRAFT Okay, Roy. Thank you. We'll see you there.

NASA 946 NASA 946, Houston.

PAO This is Shuttle Control. Botswana has loss of signal. Columbia now 6 minutes away from the deorbit maneuver. And about 32 minutes, 40 seconds away from entering the earth's atmosphere. Columbia and its crew ready to come home. We'll get a burn report at Guam in about 23 and 1/2 minutes. At 5 days, 1 hour, 11 minutes mission elapsed time this is Shuttle Control, Houston.

CAPCOM NASA 946, Houston.

NASA 946 946, go ahead. We don't have anything else to report on the weather. We went in that time at ... We went in this little layer at about 20 thousand and broke out that time at 16-5.

CAPCOM Okay, looks to be pretty thin now then. Only a couple thousand feet thick.

NASA 946 That's affirm, but you know when the sun first comes up I'm not sure how the crew's going to be able to, whether they're going to be able to see through it or not.

CAPCOM Roger, understand.

CAPCOM Okay, 946. We appreciate that and we'll just standby here until we're approaching Guam and if you have anything else to pass on we'll be available.

NASA 946 46, Roger. Okay, we also find there's a trace of ice in these clouds but it's just a trace.

CAPCOM Roger.

PAO This is Shuttle Control. Columbia should be in its deorbit burn now using both OMS engines. The burn of 268.7 feet per second. Duration 2 minutes, 24 seconds with the resulting orbit of 155 by 0 nautical miles. We'll get a report on this burn at Guam in 17 minutes. At 5 days, 1 hour, 18 minutes mission elapsed time, this is Shuttle Control, Houston.

PAO This is Shuttle Control. The touchdown clocks have been started here in the control center now. Shows 51 minutes, 50 seconds from touchdown at Edwards.

NASA 946 Houston, NASA 946, over.

CAPCOM 946 this is Houston, go ahead.

NASA 946 Roger, our last pass all the papies and the ball bar were working good and so, as well as the MLS, and the TACANS. This layer, we can - now start to see it. It's a scattered to broken layer and it's got some puffy little cumulus what it is.

CAPCOM Okay, John we copy the papies and the ball bar are working fine and the layer is scattered to broken. Thank you.

NASA 946 Roger, and if it just happens to be right over the area where they're making the turn in, they probably won't be able to see the ground but if it's away from it one way or the other they will be.

CAPCOM Okay, John. We understand.

PAO This is Shuttle Control. Again, was astronaut John Young in the shuttle training aircraft talking to CAPCOM Roy Stewart that time concerning the position and approach lights on the runway. Correction, it's Bob Stewart and Roy Bridges the CAPCOMS. That time John Young was talking to Bob Stewart. Roy Bridges will be the prime CAPCOM for landing.

END OF TAPE

PAO their time concerning the position and approach flights on the runway.

PAO Correction, it's Bob Stewart and Roy Bridges, the capcoms. That time, John Young was talking to Bob Stewart. Roy Bridges will be the prime capcom for landing.

CAPCOM NASA 946, Houston.

NASA 946 46, go.

CAPCOM Roger, we're coming up on Guam, AOS, we'd like to sign off, do you have any other things you'd like to pass on to us?

NASA 946 Wind has died down to 370 it's about 240 at about 40 knots is what it was.

CAPCOM 240 at 40 at 370.

NASA 946 Yeah, actually, we're looking right now at 240 at 65.

CAPCOM Okay.

CAPCOM I'll call you up again after we go LOS Guam, about 10 minutes.

NASA 946 Roger, that.

PAO This is Shuttle Control, at 5 days, 1 hour, 33 minutes, mission elapsed time. Columbia is approaching acquisition through Guam. This pass will be almost 6 minutes in duration. We'll standby for a report on the deorbit burn.

CAPCOM Columbia, Houston with you through Guam for 6 minutes, configure AOS.

SPACECRAFT Roger, configure AOS on time, good burn.

CAPCOM That's great news, Vance, understand good burn.

SPACECRAFT They're completely nominal.

CAPCOM Roger.

PAO This is Shuttle Control, telemetry shows all 3 APUs up and running normally. These auxillary propulsion units used to power the hydraulic system aboard Columbia, enabling the movement of control, flight control surfaces.

CAPCOM Columbia, Houston, we confirm you have a good vector. And all your other systems are looking very good. We recommend when you go to deploy the probes, that you use the deploy heat position. Weather remains very good, no big changes from the last report.

SPACECRAFT Okay Roy, thanks very much, as you can see we're in 3 0 4, and looking good.

CAPCOM Roger.

CAPCOM Columbia, Houston, we're 30 seconds LOS at Guam, we'll see you at Buckhorn shortly, have a good entry, configure LOS.

SPACECRAFT Okay, configure LOS, thank you.

PAO This is Shuttle Control, Guam has loss of signal with Columbia. There's a possibility we may have contact through Hawaii. And we'll come up at that time about 9 and a half minutes from now to see whether we are able to get anything prior to blackout

CAPCOM NASA 946 Houston, we're back with you.

PAO Columbia, now a minute and 41 seconds away from entry into the Earth's atmosphere, at approximately 400,000 feet. Committed now to return to Earth after that good deorbit burn. Commander Vance Brand, describing it as on time and completely nominal. Columbia's state vector is good, there is no need to update that here at Guam.

NASA 946 Roger, Houston, 946, that (garble)

PAO Columbia and it's crew of four is heading toward runway 2 2 at Edwards Air Force Base in California.

CAPCOM Roger, copy.

NASA 946 Clouds at 19,000 and we're out at (garble)

PAO Touchdown clock says 31 minutes, 40 seconds away from touchdown on runway 2 2.

NASA 946 (garble) on all the NAV aids are working good, the visibility is now starting to get where you can see - -

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PAO We'll come back up at Hawaii AOS, and see if we do
have any acquisition.

PAO This is Shuttle Control, there is 1 chase plane,
will be air born at Edwards when Columbia lands. Pilot is
Charles Justus

END OF TAPE

PAO This is Shuttle Control, there's one chase plane will be airborne at Edwards when Columbia lands, Pilot is Charles Justus, cameraman in the rear seat is Pete Stanley, both are from the Johnson Space Center.

CAPCOM Have you completed that approach?

NASA 946 946, say again over.

CAPCOM Roger, are you climbing out for another approach?

NASA 946 This will be the last one.

CAPCOM Roger. And 946, if you have nothing to pass to us right now, while your climbing up again, we'll reconfigure so that the COMM folks can check out all the links real quick. I'll be back with you in about 2 or 3 minutes.

NASA 946 Alright. I'm at the pass right now.

CAPCOM Okay.

PAO This is Shuttle Control, we'll stand by for a couple of minutes here and see whether we do acquire data from Hawaii.

CAPCOM NASA 946, Houston, we're back with you.

NASA 946 This is 946, that was our last pass, and it looks real good.

CAPCOM Okay, and thank you very much 946, for the weather reports and I'm happy it turned out good, we've got them over Hawaii now, we're processing a little bit of C-band data and at the last LOS over Guam they were looking real good.

NASA 946 Roger, and there's places where you can see some holes in the clouds, but for the most part I think they are going to have to fly through that layer on instruments.

CAPCOM Copy. You can still see through it but, you're afraid they won't be able to, right?

NASA 946 That's affirm, there's not very much there to see.

CAPCOM Roger. And 946, Houston, are you going to Palmdale for your landing?

NASA 946 (garble)

CAPCOM Roger.

PAO This is Shuttle Control at 5 days 1 hour 54 minutes, Mission Elapsed Time. We had some brief C-band radar contact at Hawaii but no telemetry.

NASA 946 Houston, 946, the speed brake positions throughout those approach in automatic was normal, that's the way Vance usually flies it, and it didn't show any tendency to close at 4000 ft. I don't think you need to tell him that. And I'm not sure how valid the SPA is on that kind of information either.

CAPCOM Okay roger, understand, so it looks like a nominal closing at 2500 and auto.

NASA 946 Yes sir.

CAPCOM Okay, thank you, and we'll be reconfiguring the UHF now, for standard entry configuration.

PAO This is Shuttle Control, and astronaut John Young continuing to provide information on the weather and his approaches to the runway at Edwards. Clock showing 19 minutes 26 seconds from touchdown. We'll come back up prior to acquisition through Buckhorn. This is Shuttle Control Houston.

CAPCOM Chase, Houston, radio check, how do you read?

CHASE Load and clear.

CAPCOM Roger, your 5 by.

This is NASA Dryden, at Edwards Air Force Base, about 19 minutes prior to Columbia's touchdown. It's just growing light here in the Mojave desert, and Columbia's touchdown should occur at 6:34 a.m. Pacific Standard Time, we're about 8 minutes after local sunrise. The recovery convoy moved into position near runway 22 at 4:25 a.m. again, local time, and is now in the posture to support landing and recovery operations. As soon as Columbia rolls to a stop, the recovery convoy will head toward the vehicle to begin preliminary securing and phasing out operations. This convoy consists of about 20 specialized vehicles varying approximately 100 personnel. After rollout the convoy will take up a position of about 1250 ft, up under the orbiter while personnel wearing protective garments check the vehicle for toxic or explosive vapors. After the area is declared safe, the remainder of the convoy will move in with the specialized vehicles to purge and cool the orbiter and enable the crew to disembark. The flight crew will deactivate onboard systems and may be able to leave Columbia then 40 minutes after touchdown. Runway 22 on which Columbia will be landing is paved

after the area is declared safe the remainder of the convoy will in with the specialized vehicles to purge and cool the orbiter, and enable the crew to disembark. The flight crew will deactivate onboard systems and may be able to leave Columbia within 40 minutes after touchdown. Runway 22, on which Columbia will be landing, is paved with concrete and is 15,000 feet long and 300 feet wide. These are the same dimensions of the Shuttle Landing Facility at the Kennedy Space on which orbiters will begin making touchdowns as the Shuttle Program matures. As many as 150,000 guests may be enduring locations around the Rogers Dry Lake bed to view the landing, despite the early hour and temperature in the low 40s. Weather predictions for touchdown time call for scattered clouds at 15,000 feet, building clouds 22,000 feet, visibility should exceed 7 miles, and winds are calm. This NASA Dryden at Edwards Air Force Base.

PAO This is Shuttle Control, we're getting data through the western test range now.

PAO Altitudes about a 183,000 feet, mach 13.8. Getting C-band radar now. Shows Columbia 550 miles from the runway. Show them auto now, and we have AOS at Buckhorn.

CAPCOM Chase, Houston, standby for mach 12.

PAO Flight Dynamics Officer reports nominal energy, nominal ground track.

CAPCOM Mark, mach 12.

PAO Altitude 172,000 feet. Looking very good. Range 440 miles at 167,000 feet. Mach 11.

CAPCOM Columbia, Houston with you through Buckhorn, configure AOS.

SPACECRAFT Roger, configure AOS. We're in the first roll maneuvers.

CAPCOM Roger.

SPACECRAFT And Roy, we have an AC overload, nothing else on the system, looks like it's that overload system.

CAPCOM Roger Bob, and we've checked and your AC systems are all good.

SPACECRAFT Okay.

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PAO Columbia's at mach 9 at a 154,000 feet, range 331 miles. Everything looking good. 142,000 feet, mach 7.7 range 250 miles. Columbia's trace on the forward chart right on the ground track predicted. Mach 6.7 at a 130,000 feet, range 210.

SPACECRAFT How are the TACANS looking Houston?

CAPCOM Columbia, Houston, take TACAN.

SPACECRAFT Got it.

PAO Tactical air navigation system now being incorporated in Columbia. Mach 5.6 at a 121,000 feet, range 163 miles. Crew conducting the program test inputs, the aerodynamic test on reentry. Small maneuvers in changes and attitudes. Mach 4.8 at a 111,000 feet, range 130 miles. Columbia approaching the coast now. Ground track will cross the California coast, south of Santa Barbara, very near the town of Copenteria. Mach 4 and Columbia should be crossing the coast line right about now, range is 100 miles, altitude is 100,000 feet. This ground track very near the track that STS-4 flew. Columbia will pass over the Condor Sanctuary and over the town of Fairmont, Loisman Dry Lake before going into

END OF TAPE

PAO This ground track very near the track that STS-4 flew. Columbia will pass over the Condor Sanctuary and over the town of Fairmont, Rosemond dry lake before going into the turn to the runway.

SPACECRAFT Houston, our data looks good on board.

CAPCOM Columbia, Houston. Take ^{log} ~~care~~ ^{air} of data.

PAO Mach 2.8 at 87,000 feet with a range of 67 miles. Columbia still right on the predicted ground track, right on energy.

PAO Columbia's 2 times the speed of sound now at 74,000 feet. Range 48 miles.

PAO Everything still looking very good at mach 1.7, 70,000 feet.

CAPCOM Columbia, Houston request vector transfer to backup and altimeter, 2995.

SPACECRAFT Okay, will change altimeter and vector transfer.

CAPCOM Roger, and the surface wind is calm.

SPACECRAFT Roger, calm surface wind.

PAO Mach 1 now at 51,000 feet, range 27 miles.

PAO Columbia subsonic now at mach .9 at 46,000 feet and a range of 25 miles.

PAO Control stick steering now.

PAO 38,000 feet, mach .8, range 20 miles.

PAO And the chase plane has video of Columbia on the monitors in the newscenter now.

PAO Altitude's 28,000 feet.

(garble) coming aboard.

PAO Holding 1.6 g's on the heading alignment circle at 22,000 feet at a air speed of 275 knots. Range is 11 miles.

CAPCOM Columbia, Houston. You're looking real good on the hack.

SPACECRAFT Rog.

PAO Out at 18,000 feet now at a air speed of 260 knots.

PAO Going through a cloud deck.

SPACECRAFT (Garble), tenth (garble), Roy.

PAO 14,000 feet.

CAPCOM Okay, we show you right on the glide slope.

PAO This shot from ground cameras now on the monitors in the newscenter. Right on the glide slope. 9,000 feet. 281 knots. 5,000 feet, 2800 feet, 289 knots. Gear down. Show the gear locked now. Unofficial touchdown time was 5 days, 2 hours, 14 minutes, 25 seconds. That unofficial touchdown time again 5 days, 2 hours, 14 minutes, 25 seconds. Columbia performing a maximum braking test on this landing.

SPACECRAFT Hey Roy, are we down now? That was a, are we on the ground?

CAPCOM Absolutely, it was beautiful and you certainly lived up to your motto this flight. Welcome home.

SPACECRAFT Yes sir, we deliver. We delivered. Nice to be back.

CAPCOM Lot of applause in the room here and we're very happy to have all you guys home again.

SPACECRAFT Thanks a lot. (garble) We overstopped.

That's copy Columbia, thank you.

END OF TAPE

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JAN 25

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